TABLES OF CONTENTS

Table of Contents - Volume 1

		Page
1.0	INTRODUCTION	1
	1.1 Purpose of Study	1
	1.2 Authority and Acknowledgements	1
	1.3 Coordination	2
2.0	AREA STUDIED	2
	2.1 Scope of Study	2
	2.2 Community Description	5
	2.3 Principal Flood Problems	6
	2.4 Flood Protection Measures	8
3.0	ENGINEERING METHODS	15
	3.1 Hydrologic Analyses	15
	3.2 Hydraulic Analyses	29
4.0	FLOOD PLAIN MANAGEMENT APPLICATIONS	33
	4.1 Flood Boundaries	33
	4.2 Floodways	33
5.0	INSURANCE APPLICATION	34
	5.1 Reach Determinations	34
	5.2 Flood Hazard Factors	34
	5.3 Flood Insurance Zones	61
	5.4 Flood Insurance Rate Map Description	62

BEST COPY AVAILABLE

Table of Contents - Volume 1 (continued)

	Page
6.0 OTHER STUDIES	62
7.0 LOCATION OF DATA	62
8.0 BIBLIOGRAPHY AND REFERENCES	62

FIGURES

Figure 1 - Vicinity Map	4
Figure 2 - Historic Flood Photograph	9
Figure 3 - Historic Flood Photograph	9
Figure 4 - High-Water Marks	10
Figure 5 - High-Water Marks	10
Figure 6 - Potential Flood Heights	11
Figure 7 - Potential Flood Heights	11
Figure 8 - Potential Flood Heights	12
Figure 9 - Potential Flood Heights	12
Figure 10 - Potential Flood Heights	13
Figure 11 - Potential Flood Heights	13

TABLES

Table 1 - Flood Control Data of Structures	14
Table 2 - Summary of Discharges	16 - 25
Table 3 - Summary of Ponding Volumes	25 - 26
Table 4 - Summary of Stillwater Elevations	26 - 28
Table 5 - Flood Insurance Zone Data	35 - 60

BEST COPY AVAILABLE

Table of Contents - Volume 1 (continued)

EXHIBITS

Exhibit 1 - Flood Profiles

Arroyo 1	Panels 01P-10P
Arroyo 1A	Panels 11P-16P
Arroyo 2	Panels 17P-19P
Arroyo 2-Arroyo 2A	Panels 20P-24P
Arroyo 2	Panels 25P-29P
Arroyo 3	Panels 30P-43P
Arroyo 3A	Panels 44P-45P
Arroyo 3B	Panels 46P-49P
Arroyo 4	Panels 50P-57P
Arroyo 5	Panels 58P-61P

Table of Contents - Volume 2

Arroyo 6	Panels 62P-67P
Arroyo 6A	Panels 68P-70P
Arroyo 6B	Panels 71P-72P
Arroyo 7	Panels 73P-76P
Arroyo 8	Panels 77P-81P
Arroyo 8A	Panels 82P-89P
Arroyo 8B	Panels 90P-103P
Arroyo 8C	Panels 104P-109P
Arroyo 8D	Panels 110P-111P
Lower Valley Area	Panels 112P-114P
Upper Valley Area	Panels 115P-120P
Flow Path No. 11	Panel 121P
Flow Path No. 13	Panels 122P-124P
Flow Path No. 13A	Panels 125P-126P
Flow Path No. 14	Panels 127P-131P
Flow Path No. 15	Panels 132P-134P
Flow Path No. 16	Panels 135P-137P
Flow Path No. 17	Panels 138P-142P
Flow Path No. 17A	Panel 143P
Flow Path No. 18	Panel 144P
Flow Path No. 19	Panel 145P
Flow Path No. 20	Panels 146P-150P

Table of Contents - Volume 3

Flow Path No. 20A	Panels 151P-155P
Flow Path No. 21	Panels 156P-158P
Flow Path No. 21A	Panels 159P-162P

BEST COPY AVAILABLE

EXHIBITS - continued

Exhibit 1 - Flood Profiles	
Flow Path No. 22	Panels 163P-167P
Flow Path No. 23	Panels 168P-171P
Flow Path No. 24	Panels 172P-174P
Flow Path No. 25	Panel 175P
Flow Path No. 26	Panels 176P-177P
Flow Path No. 27	Panels 178P-186P
Flow Path No. 28	Panels 187P-195P
Flow Path No. 28A	Panel 196P
Flow Path No. 29	Panels 197P-198P
Flow Path No. 30	Panel 199P
Flow Path No. 31	Panel 200P
Flow Path No. 32	Panels 201P-202P
Flow Path No. 32A	Panel 203P
Flow Path No. 33	Panels 204P-205P
Flow Path No. 36	Panel 206P
Flow Path No. 37	Panel 207P
Shallow Flooding Along Franklin Drain	Panel 208P
Flow Path No. 38	Panels 209P-215P
Flow Path No. 38A	Panels 216P-221P
Flow Path No. 38B	Panels 222P-227P
Flow Path No. 39	Panels 228P-240P

Flow Path No. 39A	Panels 241P-245P
Flow Path No. 40	Panels 246P-257P
Flow Path No. 41	Panels 258P-266P
Flow Path No. 41A	Panels 267P-274P
Flow Path No. 42	Panels 275P-281P
Flow Path No. 43	Panels 282P-290P
Flow Path No. 44	Panels 291P-299P
Flow Path No. 45	Panels 300P-306P
Flow Path No. 45B	Panels 307P-311P
Flow Path No. 45C	Panels 312P-317P
Flow Path No. 46	Panels 318P-321P
Flow Path No. 47	Panels 322P-327P
Flow Path No. 48	Panels 328P-331P

Exhibit 2 - Flood Insurance Rate Map Index
Flood Insurance Rate Map

BEST COPY AVAILABLE

FLOOD INSURANCE STUDY
CITY OF EL PASO, TEXAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of El Paso, El Paso County, Texas, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The original hydrologic and hydraulic analyses for this study were performed by the Albuquerque District of the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement Nos. IAA-H-2-73, Project Order No. 2; IAA-H-19-74, Project Order No. 18; IAA-H-7-76, Project Order No. 12, Amendment No. 6; and IAA-H-10-77, Project Order No. 1, Amendment Nos. 5 and 7. This work was completed in March 1979.

The hydrologic and hydraulic analyses for revising the northwestern portion of El Paso were also performed by the Albuquerque District of the COE for FEMA, under Inter-Agency Agreement Nos. IAA EMW-E-0105, Project Order No. 2; IAA EMW-E-0105, Project Order No. 2, Amendment No. 1; and IAA EMW-E-0105, Project Order No. 2, Amendment No. 2. The revised study was completed in December 1981.

BEST COPY AVAILABLE

1.3 Coordination

Areas requiring detailed study were identified by representatives of FEMA, the COE, and the City of El Paso Planning Department through correspondence and coordination meetings in 1970, 1971, and 1972. Through this coordination, it was determined that only the northwestern portion of El Paso would be studied, and that the remainder of the city would be studied at a later date.

In July 1975, the COE met with representatives of the El Paso Department of Public Works to make preliminary identification of the areas in the remainder of the city that needed to be studied. At a meeting in August 1976, attended by representatives of FEMA, the COE, the Texas Water Development Board, the El Paso Director of Public Works and the El Paso City Engineer, the study for the northwestern portion of the city was reviewed, and the remaining portions of the city needing to be studied were identified.

The following agencies were contacted to obtain pertinent data of the study area: the Natural Resources Economic Division; the Economic Development Administration; the U. S. Geological Survey (USGS); the Bureau of Reclamation; the Soil Conservation Service (SCS); the National Oceanic and Atmospheric Administration; the National Weather Service; the Texas Water Development Board; Texas A&M University; the Texas Department of Water Resources; and the El Paso Council of Governments.

During the course of the study, flood elevations, flood boundaries, and floodway delineations were reviewed with city officials in the Engineering Department.

In May 1979, the results of the study for the entire city were reviewed at a meeting in El Paso attended by representatives of FEMA, the City of El Paso, the COE, and the Texas Department of Water Resources. On July 1, 1980, the results of the entire study were presented at a final Consultation and Coordination Officer's (CCO) meeting attended by representatives of FEMA, the City of El Paso, and the COE.

In February 1982, results of a revision for the northwestern portion of the city were reviewed at a meeting held with representatives of FEMA, the City of El Paso, and the COE.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of El Paso, El Paso County, Texas. The flood hazards associated with the Rio

BEST COPY AVAILABLE

Grande River were excluded from this study because the river is under the jurisdiction of the International Boundary and Water Commission. The area of study is shown on the Vicinity Map (Figure 1).

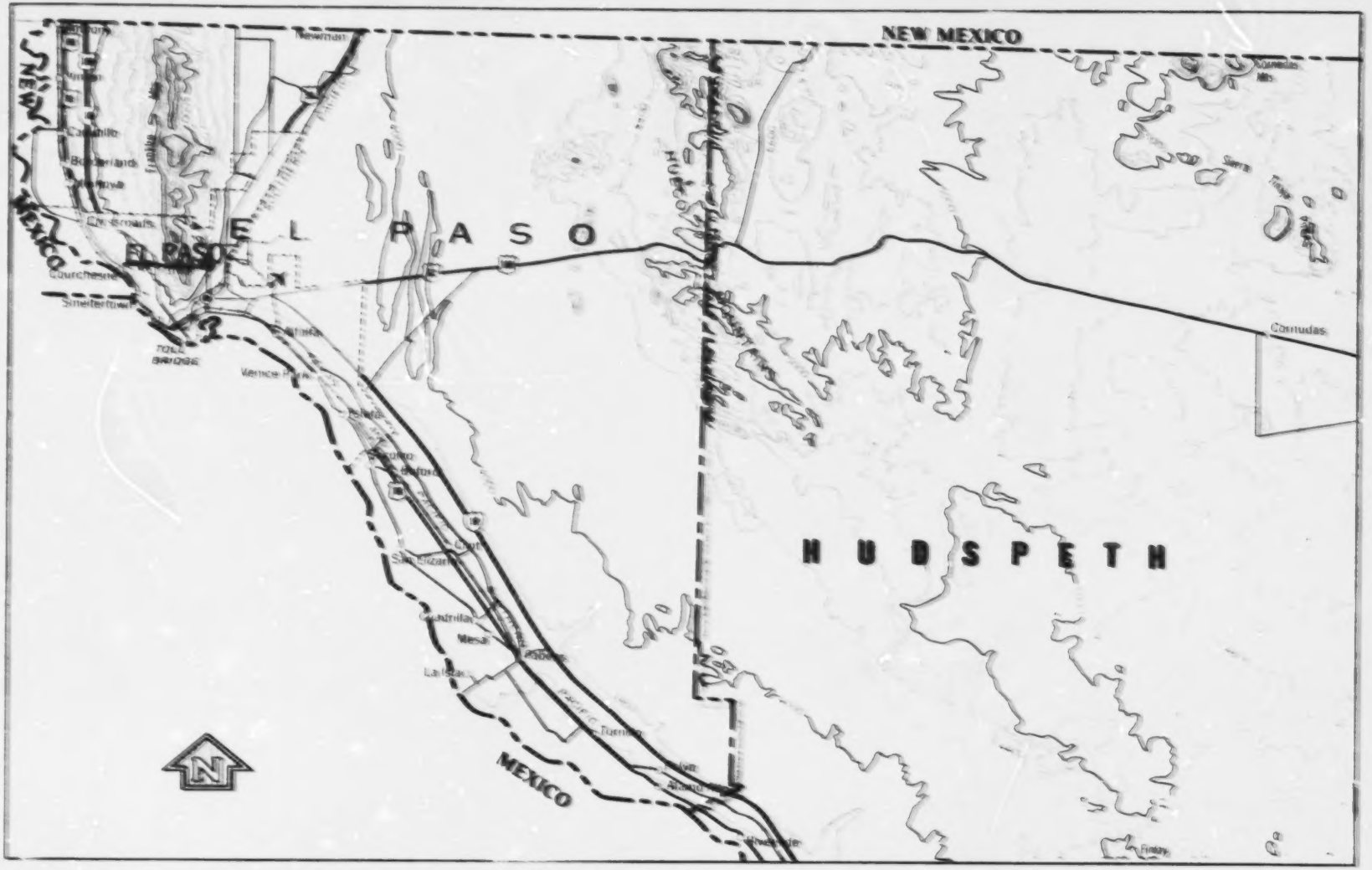
Floods caused by the overflow of eight arroyos and tributaries in the northwestern portion of El Paso and numerous flow paths in the remainder of the city were studied by detailed and approximate methods. These arroyos and flow paths consist of well-defined channels, channels based on recent flow paths, street flow, drainage ditches, and combinations thereof. Since many of these do not have names, numerical designations have been assigned to the arroyos (1-8) and flow paths (9-37) to maintain continuity in the study. Tributaries of the arroyos and flow paths have been identified with an alphabetical suffix. If the arroyo or flow path has a locally known name, it will be included in the identification.

The limits of detailed study in the northwestern portion of El Paso were determined by FEMA, the city, and the COE at a meeting held in August 1979. This included a restudy of the eight arroyos and their tributaries and a new analysis of eleven flow paths (38-48) in a newly annexed northwestern area. However, it was determined that Arroyos 6 and 7 needed no further study since their flows are diverted into the Oxidation Pond Dam through the Buena Vista Diversion Channel.

During the course of the study, it was determined that flooding on the Diana Drain flood plain was controlled by Flow Path No. 16. The flooding on the flood plains on Flow Path Nos. 34 and 35 is less than 1 foot and, therfore, Zone B designations were found to be appropriate for these areas. Detailed study on most arroyos and flow paths was terminated in the upper reaches because the flood plains were 200 feet or less in width, or because the drainage area was less than one square mile. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Approximate analyses were used to study two areas adjacent to the northeastern and southeastern areas and two arroyos in and adjacent to the northwestern area that are subject to possible development in the future. Also, the lower end of Arroyo 2 in the northwestern area was studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the City of El Paso.

BEST COPY AVAILABLE



FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FIGURE 1

APPROXIMATE SCALE

8 0 8 16 24 MILES

4

VICINITY MAP

BEST COPY AVAILABLE

2.2 Community Description

The City of El Paso is located in the western portion of El Paso County in southwestern Texas on the International Boundary of the United States and the Republic of Mexico. It is bordered by the Republic of Mexico to the south, unincorporated areas of Dona Ana County, New Mexico, to the west and north, unincorporated areas of Otero County, New Mexico, to the north, and unincorporated areas of El Paso County, Texas, to the east and west. El Paso is the fifth largest city in Texas. The city experienced a relatively slow growth prior to 1945 but has grown tremendously since that time. In 1950 and 1960, it had a population of 130,485 and 276,687, respectively. According to the U. S. Bureau of the Census, the population was 322,261 in 1970 and 425,259 in 1980 (References 1 and 2).

Expansion of the city has been to the northwest, northeast, and southeast because of the natural and political boundaries. The International Boundary prevents growth to the southwest, and the Franklin Mountains prevent expansion into a large area in the northern part of the city. Because of these barriers, the city is divided into four separate and distinct areas: northwest, northeast, central, and southeast.

The Rio Grande River forms the western corporate limits of El Paso and is also the International Boundary. The river flows southeast from the northwestern corporate limits to the southeastern corporate limits. Arroyos in the northwestern and northeastern areas generally head on the slopes of the Franklin Mountains and flow through the city. In most cases, the arroyos, after leaving the mountains, become poorly defined in developed areas. The arroyos in the southeastern section of El Paso generally head on the mesa adjacent to the eastern corporate limits and flow southwest toward the Rio Grande River.

The topography within El Paso varies from nearly sea level along the Rio Grande River to increasing slopes in the alluvial fans at the foot of the Franklin Mountains to very steep slopes in the mountainous areas. The Franklin Mountain range is approximately 20 miles in length from north to south. The maximum width of the range is 8 miles, and the highest elevation is 7,100 feet. The sloping outwash plains are made up of surface material derived from the highlands, with the size of the material decreasing from boulders to fine sand as the distance of travel increases and slopes decrease. The depth of this material varies from shallow to great as the terrain levels off. The Rio Grande Valley on the U. S. side is a flat plain varying in width from a few hundred feet to approximately 4 miles.

The climate of El Paso is semi-arid continental, characterized by moderately hot summers, mild winters, and short spring and fall seasons. The average annual temperature is 63.4 degrees Fahrenheit (°F), with recorded extremes of 109°F and -8°F. El Paso is located in the

BEST COPY AVAILABLE

transitional zone of the Gulf of Mexico and Pacific rainfall provinces. This complex meteorological condition is further complicated by the presence of the mountains. The average annual precipitation is approximately 8.42 inches.

The maximum recorded rainfall in a 24-hour period was 2.89 inches in September 1941. Severe rainfall has been reported, such as 6.5 inches in a two-hour period on July 9, 1881, and 8 inches in one day in 1863. Approximately 59 percent of the annual rainfall occurs during the period of July through October, with the greatest amounts falling during July and August when small localized thunderstorms are prevalent.

The undeveloped portions of the watersheds support only a meager growth of desert-type vegetation, while the irrigated land in the valley produces abundant agricultural crops.

Development in the flood plains consists of single- and multi-family residences, industrial and commercial establishments, and agricultural land. New development is occurring throughout the city at a rapid pace.

2.3 Principal Flood Problems

References to historic floods in the study area prior to 1940 are meager. References to floods since that time are more plentiful because of the expansion of the city into areas more susceptible to flooding. Floods of major proportions occurred in 1949, 1950, 1955, 1957, 1958, 1962, 1963, 1965, 1966, 1967, 1968, and 1971. Technical data for these floods are not available and, therefore, cannot be related to any particular frequency flood.

Flooding in El Paso is generally of the flash flood type, with a high peak and a low volume. The following descriptions of the August 3, 1966, flood were extracted from the El Paso Times and a COE flood report (References 3 and 4). The August 1966 flood was typical of the floods that occur in El Paso.

El Paso Times

> A devastating cloudburst struck the Upper Valley Wednesday afternoon sending roaring waters from the slopes of the Franklin Mountains, tearing down homes, undermining railroad tracks, pummelling bridges and leaving more than two inches of rain in the area.
>
> No injuries were reported...as the water flooded wide sections of the crossroads and Coronado areas....Two inches of water flowed through many business establishments in the Coronado area.... Doniphan was closed to traffic for awhile....

BEST COPY AVAILABLE

Doniphan would remain closed south of the Crossroads until Highway Department crews could repair damage and clear the silt and other debris....Santa Fe Railroad....tracks were still in place, but suspended as much as two feet in the air. Water was reported standing in yards and streets in the Coronado and County Club areas, as much as a foot deep in places. Most serious flooding of homes occurred along Love, Lindberg and Sunset where 18 inches of muddy water stood in the streets and several homes....Several automobiles were stalled by the high water....a Cadillac...was swept off of Doniphan into a ditch....Highway patrolmen estimated that at the height of the flooding, about 2 p.m., water rushing down the arroyos and undermining Doniphan and the Santa Fe tracks was five feet deep in places...

COE Flood Report

Floodwater inundated a portion of the upper valley area of El Paso from above the intersection of Mesa Road and Doniphan Drive to the El Paso Electric Company generating plant. The rain that produced the flood occurred over a small area, with its center near Coronado Hills Shopping Center on Mesa Road. The short intense storm produced as much as two inches of rainfall in 45 minutes, with a total amount of 2.40 inches. The floodwaters came down the arroyos which approach Doniphan Drive at almost right angles. The change of slope at the road plus the barrier formed by the highway and railroad embankment caused the floodwaters to drop most of the sediment load on or adjacent to Doniphan Drive. The sediment blocked the drainage structures under the embankments and caused the water to spread to a width of approximately 3.5 miles along Doniphan Drive. Sediment depths of two to three feet were prevalent along the 3.5 mile stretch.

The size of the peak flows, one estimated at 2,500 cubic feet per second, resulted in the floodwaters ponding and overtopping the Atchison Topeka and Santa Fe Railway embankment. This washed out some ballast and at one location (near the Mesa Road and Doniphan Road intersection) the entire embankment was washed out for 200 feet.

As the floodwaters crossed west of the track, a lowlying valley area was flooded from Mulberry Avenue to the El Paso Electric Company generating plant. This area is a manmade catchment area that is traversed by irrigation laterals, ditches and drains, plus numerous roads. Most of these structures are perched and tend to trap the water till it reaches depths to overtop the embankments. The area is hindered further by the complete lack of interior drainage facilities to the leveed Rio Grande. Thus, the area, which is urban and suburban in development, was flooded up to depths of three feet.

BEST COPY AVAILABLE

Figures 2 and 3 show damage caused by historic floods. Figures 4 and 5 show high-water marks at two locations within El Paso. Figures 6 through 11 show potential flood heights of the 100-year flood at selected locations within El Paso.

There has been extensive development on the broad alluvial fans and in the foothills of the Franklin Mountains. Land developers have made massive cut and fill operations in the foothills to provide graded terraces for development. Often, these developments disregard or pre-empt the natural drainage courses, diverting flood flows into new and unpredictable flow paths. Some development exists in sumps where floodwaters pond during high flows. During past floods, extensive damage was caused by ponding behind and along the street, highway, and railroad embankments.

2.4 Flood Protection Measures

The City of El Paso constructed a storm sewer system for the downtown area in the 1920s. The system consists of pumping plants and storm sewers to collect and discharge storm runoff into the Rio Grande River. In 1932-1933, the Civilian Conservation Corps (CCC) built a series of small check dams along the southeastern slope of the Franklin Mountains to McKelligan Canyon to further improve flood control in the downtown area.

In 1949-1950, the storm drainage system for the downtown area was improved and expanded to the older sections of the city. These included outlets to the Rio Grande River and a new series of small detention dams constructed around the point of the Franklin Mountains to supplement those built by the CCC. The city has also constructed detention dams and established ponding areas in other parts of the city. Most of these detention dams and ponding areas do not have the storage capacity to control 100-year floods or larger.

The COE investigated the arroyo flood problem in El Paso and has implemented a single-purpose flood control plan (Reference 5). It comprises a system of detention reservoirs, diversion dikes, and channels to collect, regulate, and discharge arroyo runoff into the Rio Grande River. The only structures completed are located in the northeast-central and northwestern sections of El Paso. These structures will control floods up to and including the 500-year flood. Pertinent flood control data of these and other structures are shown in Table 1, "Flood Control Data of Structures."

BEST COPY AVAILABLE

Figure 2 - Damage to residence caused by the 1968 flood.

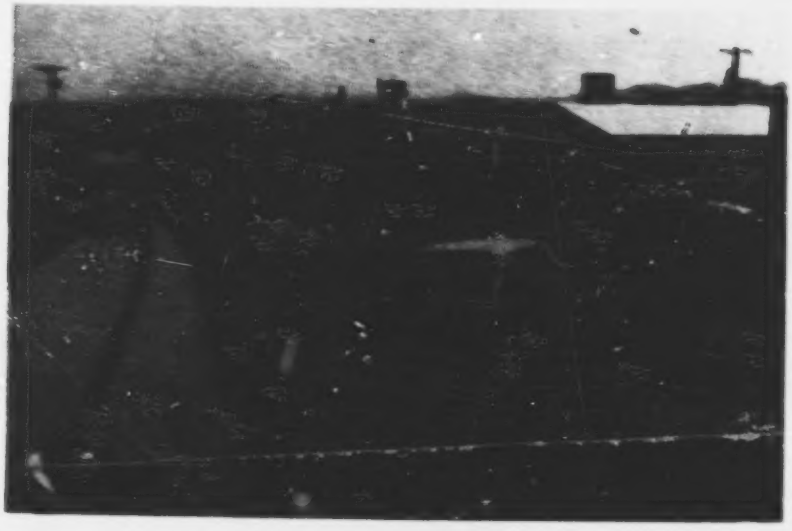


Figure 3 - Damage caused by ruptured water main at Brown Street above Cliff Drive during flood of 1971.

BEST COPY AVAILABLE

Figure 4 - High-water mark from the flood of 1967 near the corner of Mt. Berdu and Raymond Telles.

Figure 5 - High-water mark from the flood of 1967 at the east dead end of Catskill Avenue.

BEST COPY AVAILABLE

Figure 6 - Potential 100- and 500-year flood heights at Calgary Avenue and Alcan Street in northeast El Paso. The 100-year flood has a depth of 4 feet, and the 500-year flood has a depth of 4.7 feet.

Figure 7 - Potential 100- and 500-year flood heights on the Bon Aire Drive bridge between Sun Valley Drive and Aries Drive. The depth of the 100-year flood is 2.7 feet, and the depth of the 500-year flood is 3 feet.

BEST COPY AVAILABLE

Figure 8 - Potential 100- and 500-year flood heights at the intersection of Cebada and Frutas, looking north. The depth of the 100-year flood is 2.5 feet, and the depth of the 500-year flood is 3.4 feet.

Figure 9 - Potential 100- and 500-year flood heights at the intersection of Cebada and Gateway Boulevard West, looking south. The depth of the 100-year flood is 5.4 feet, and the depth of the 500-year flood is 5.6 feet.

BEST COPY AVAILABLE

Figure 10 - Potential 100- and 500-year flood heights at the intersection of Cabada and Durazno Avenue, looking west. The depth of the 100-year flood is 6.9 feet, and the depth of the 500-year flood is 7.1 feet.

Figure 11 - Potential 100- and 500-year flood heights at Mt. Hagon Drive and Blue Ridge Drive, looking north. The depth of the 100-year flood is 4.7 feet, and the depth of the 500-year flood is 5.3 feet.

BEST COPY AVAILABLE

TABLE 1 - FLOOD CONTROL DATA OF STRUCTURES

Structure	Storage Capacity (Acre-Feet)	100-Year Discharges (cfs) Conduit	Spillway
Durazno Dam	310	270	0
Fusselman Dam	595		
Giles Dam	93		
Keltner Dam	47	0	0
Keystone Dam*	1,020	660	0
McKelligan Dam No. 1	8	Dam Overtopped	
McKelligan Dam No. 2	38	Dam Overtopped	
McKelligan Dam No. 3	31		
McKelligan Dam No. 4	14		
Mesa Dam	778	220	0
Mountain Park Dam	235	104	0
Mulberry Dam	1,113	230	0
Northgate Dam	1,038		
Oxidation Pond Dam	1,462	130	0
Pasotex Dam	100+		
Pershing Dam	1,000	350	0
Range Dam	908		
Sunrise Dam	133	88	0
Thorn Dam	723	220	0
Van Buren Dam	104	320	0

Structure	Capacity Maximum (cfs)
Buena Vista Diversion	2,960 to 5,180
Borderland Diversion**	560 to 5,180
Chaparrel Park Diversion Channel and Dike	10,500
Diana Ditch	Approximately 600
Electric Diversion Channel	1,820
Fort Bliss Sump Outlet Conduit	257
Government Hill Ditch	Varies from 280 to 660
Government Hill Outfall Channel	364
Highway Diversion**	450 to 1,190
Northgate Diversion Channel	2,400
Northgate Interceptor Channel	1,450
Northgate Outlet Channel and Dike	950
Range Outlet Channel	121
Tobin Ditch	Varies from 176 to 540

*Future construction included in computations (scheduled start June 1982 and finish December 1983.

**Future construction not included in computations (scheduled start May and October 1983 and finish May 1984 and October 1985, respectively).

BEST COPY AVAILABLE

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency and peak elevation-frequency relationships for the flooding sources studied in detail affecting the community.

El Paso was divided into three separate areas for hydrologic analyses - northwest, northeast-central, and southeast. The basic hydrology for these areas was developed by the COE for the El Paso Local Protection Project (References 6, 7, and 8).

In the absence of stream gaging stations and associated data in the northwestern and southeastern areas, regional frequency curves for peak discharges and flood volumes were constructed using Snyder's synthetic unit hydrograph procedures and rainfall-frequency-duration data (References 9 and 10). This analysis followed recommended procedures outlined by the Water Resources Council (Reference 11). Two dams in the northwestern area, Mulberry and Thorn, affected flow analyses, therefore, outflows were routed using the Modified Puls method (Reference 12).

The COE HEC-1 computer program was used to develop discharge rates for the northeast-central area (Reference 13). Rainfall data used for this program were developed from reports prepared by the National Weather Service and the SCS (References 10 and 14). Discharge rates computed by the HEC-1 program were plotted on log-probability paper to develop frequency curves.

BEST COPY AVAILABLE

For these analyses, if the maximum flood storage elevation in a flood control structure not designed or operated by the COE rose to within two feet of the top of the dam, it was assumed that there was no dam.

Discharges for the 500-year flood were determined by straightline extrapolation of a single-log graph of flood discharges computed for frequencies up to 100 years.

A summary of drainage area-peak discharge relationships for the flooding sources studied by detailed methods is shown in Table 2, "Summary of Discharges." In some cases, the peak flows decrease at locations due to the existence of flood attenuating structures.

TABLE 2 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ARROYO NO. 1					
Cross section C (Below Mulberry Dam)	0.4	305	445	520	1,030
Cross section AL	*	740	1,360	1,610	2,200
Cross section X	*	1,890	3,350	3,930	5,330
Cross section T	*	440	730	950	1,110
Cross section L	4.57	440	730	850	1,110
Cross section K	*	160	240	330	440
ARROYO NO. 1A					
Cross section M	*	990	1,640	1,900	2,510
Cross section A	1.41	1,150	1,990	2,320	3,130
ARROYO NO. 2					
Cross section AJ	*	1,040	1,840	2,150	2,890
Cross section O	*	1,390	2,510	2,950	3,990
Cross section M	*	120	240	280	380
Cross section I	2.90	120	240	280	380
ARROYO NO. 2A					
Cross section P	*	1,040	1,840	2,150	2,890
Cross section V	*	1,390	2,510	2,950	3,990
ARROYO NO. 3					
Cross section AO	*	520	860	1,010	1,310
Cross section AC	*	350	535	680	869
Cross section AA	*	590	911	975	975

*Not applicable

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ARROYO NO. 3 (continued)					
Cross section Y	*	960	1,472	1,610	1,760
Cross section H	*	195	277	320	425
Cross section G	3.21	195	277	320	425
Cross section F	*	210	440	465	620
ARROYO NO. 3A					
Cross section G	*	210	330	370	480
Cross section D	*	320	600	710	980
Cross section A	0.25	320	600	710	980
ARROYO NO. 3B					
Cross section L	*	1,040	1,680	1,930	2,450
Cross section A	1.27	1,040	1,680	1,930	2,450
ARROYO NO. 4					
Cross section Z	*	210	370	420	540
Cross section P	*	317	560	650	870
Cross section L	*	240	315	350	400
Cross section I	*	180	230	260	320
Cross section F	0.49	390	620	710	910
Cross section D	0.74	390	620	710	910
ARROYO NO. 5					
Cross section K	*	410	620	710	910
Cross section G	0.37	460	730	830	1,060
Cross section C	0.74	460	730	830	1,060
ARROYO NO. 6					
Cross section D	2.4	700	1,420	1,820	2,920
ARROYO NO. 6A					
At mouth	1.8	415	810	1,290	2,330
ARROYO NO. 6B					
At mouth	1.0	320	605	745	1,550
ARROYO NO. 7					
Cross section D	1.7	485	950	1,200	2,240

*Not applicable

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ARROYO NO. 8					
Cross section P	*	180	320	370	500
Cross section L	*	300	550	650	990
Cross section K	0.58[2]	390	690	790	1,360
Cross section I	*	730	1,220	1,411	2,120
Cross section B	*	3,210	5,390	6,280	8,580
Cross section A	5.11[3]	3,210	5,390	6,280	8,580
ARROYO NO. 8A					
Cross section R	0.99[2]	320	450	610	690
Cross section P	*	670	1,020	1,150	1,530
Cross section O	*	1,044	1,730	1,970	2,565
Cross section M	*	1,044	1,730	1,850[5]	1,850[5]
Cross section H	*	1,044	1,710[5]	1,710[5]	1,710[5]
Cross section A	*	1,078	1,500[5]	1,500[5]	1,500[5]
ARROYO NO. 8B					
Cross section AG	*	960	1,550	1,790	2,320
Cross section AD	*	960	1,550	1,790	2,320
Cross section A	*	1,150	1,920	2,220	2,920
At station 11300[1]	*	1,320	2,290	2,660	3,530
At station 11190[1]	*	1,500	1,500	1,500	1,500
Cross section P	1.89[2]	1,330	1,500	1,500	1,500
Cross section E	*	1,330	2,320	2,710	3,550
Cross section D	*	1,490	2,570	3,000	4,030
Cross section C	*	2,500	4,241	4,950	6,580
Cross section B	3.07[4]	3,120	5,240	6,100	8,370
ARROYO NO. 8C					
Cross section L	Approximately 0.3	90	160	180	250
ARROYO NO. 8D					
Cross section F	Approximately 0.3	350	560	650	850

*Not applicable

[1]Feet above confluence with Arroyo No. 8

[2]Above Mesa Road

[3]Total drainage area for all Arroyo 8 systems

[4]Includes drainage areas from Arroyo Nos. 8A, 8C, and 8D

[5]Channel capacity-controlled by culverts or bridges. Remaining flow goes into street flow in overbank area

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLOW PATH NO. 9					
At corporate limits	1.3	1,200	1,900	2,200	2,900
FLOW PATH NO. 10					
At lower limit of study	2.2	1,400	2,300	2,700	3,500
FLOW PATH NO. 11					
At confluence with Flow Path No. 13	20.0	3,050	5,790	6,840	9,660
FLOW PATH NO. 13 (Drainage Channel No. 1)					
At station 15310[1]	2.6	780	1,630	1,960	2,770
At station 9480[1]	9.5	5,120	6,130	6,300	6,700
At station 5778[1]	11.3	4,000	4,000	4,000	4,000
At station 4438[1]	11.5	4,160	4,620	4,770	5,130
At station 4402[1]	12.0	4,160	4,400	4,400	4,400
At station 2650[1]	14.6	4,810	5,050	5,050	5,050
At station 500[1]	34.6	7,860	10,840	11,890	14,710
FLOW PATH NO. 13A					
At station 5740[2]	1.8	1,370	2,330	2,720	3,610
At station 1200[2]	6.7	3,830	6,490	7,590	10,120
FLOW PATH NO. 14 (Drainage Channel No. 2)					
At station 15438[2]	1.2	780	1,280	1,490	1,970
At mouth	2.5	650	650	650	650
FLOW PATH NO. 15					
At station 18500[2]	0.4	650	1,550	2,320	4,500
At station 8100[2]	1.6	1,250	3,310	4,520	6,970
At station 30[2]	14.4	1,680	3,130	4,280	6,610
FLOW PATH NO. 16					
At station 9965[2]	15.5	2,240	3,460	4,840	6,610
At station 9130[2]	15.9	1,290	3,190	4,070	5,840
At station 7560[2]	16.4	2,250	4,600	5,640	7,840
At station 6780[2]	16.7	2,070	4,400	5,460	7,660
At station 4450[2]	17.4	1,000	2,900	3,750	5,410
At station 1300[2]	18.3	450	2,090	2,850	4,810

[1]Feet above U. S. Highway 54
[2]Feet above mouth

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLOW PATH NO. 17 (McKelligon Canyon)					
At station 11450[1]	0.4	400	630	720	920
At station 9220[1]	1.1	1,200	1,870	2,140	2,740
At station 4900[1]	1.6	1,700	2,670	3,060	3,930
At station 1030[1]	2.4	2,250	3,560	4,100	5,290
FLOW PATH NO. 17A (McKelligton Canyon Tributary)					
At station 1250[2]	0.4	560	860	990	1,260
At station 2450[2]	0.4	450	700	800	1,030
FLOW PATH NO. 18					
At station 600[3]	0.4	160	240	270	310
FLOW PATH NO. 19					
At station 600[2]	0.5	160	250	280	340
FLOW PATH NO. 20					
At station 9640[2]	0.6	630	990	1,130	1,460
At station 2870[2]	1.0	1,060	1,730	2,000	2,620
At station 600[2]	2.0	1,890	3,160	3,670	4,850
FLOW PATH NO. 20A					
At station 11020[2]	0.6	500	780	900	1,170
At station 8160[2]	0.9	690	1,110	1,280	1,670
At station 000[2]	1.3	860	1,460	1,700	2,260
FLOW PATH NO. 21					
At station 6720[3]	0.4	360	570	660	860
At station 4430[3]	1.5	990	1,650	1,920	2,550
At station 2795[3]	1.6	210	260	280	330
At station 1995[3]	2.4	320	450	510	650
At station 310[3]	2.6	420	690	800	1,070
FLOW PATH NO. 21A					
At station 8645[2]	0.3	370	570	660	850
At station 2070[2]	0.8	650	1,060	1,230	1,610
At station 000[2]	0.8	120	150	170	200

[1]Feet above Alabama Street
[2]Feet above mouth
[3]Feet above Rio Grande Levee

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLOW PATH NO. 22					
At station 4190[1]	0.5	550	860	990	1,270
At station 2341[1]	0.9	990	1,550	1,780	2,290
At station 920[1]	1.2	1,320	2,080	2,380	3,070
FLOW PATH NO. 23					
At station 8330[2]	1.2	1,070	1,690	1,950	2,520
At station 875[2]	1.9	1,170	1,920	2,220	2,930
FLOW PATH NO. 24					
At station 4850[3]	0.4	710	980	1,090	1,710
At station 1360[3]	0.9	770	1,090	1,210	1,880
At station 6170[3]	0.1[5]	310	340	350	760
FLOW PATH NO. 25					
At station 2090[2]	1.4	360	920	1,160	1,260
At station 590[2]	1.5	460	970	1,210	1,780
FLOW PATH NO. 26 (Phelps Dodge)					
At station 9240[4]	1.3	700	1,200	1,400	2,100
At station 8110[4]	1.5	700	1,600	2,000	2,000
At station 7590[4]	1.5	700	1,600	2,000	3,000
At station 5390[4]	2.2	800	2,000	2,600	2,100
FLOW PATH NO. 27 (Playa Drain)					
At station 54650[4]	1.3	960	2,120	2,620	4,020
At station 54650[4]	1.3	125	125	125	125
At station 53800[4]	1.3	835	1,995	2,495	3,895
At station 52950[4]	1.4	155	175	210	235
At station 51000[4]	1.4	490	1,795	2,360	3,820
At station 50650[4]	1.4	505	1,820	2,380	3,855
At station 50125[4]	1.4	480	1,750	2,320	3,290
At station 49310[4]	1.4	470	1,670	2,270	3,735

[1]Feet above Van Buren Dam
[2]Feet above Franklin Canal
[3]Feet above entrance to Government Hill Ditch conduit
[4]Feet above mouth
[5]Included outflow from Pershing Dam

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLOW PATH NO. 27 (Playa Drain) (continued)					
At station 48500[1]	1.5	475	1,675	3,240	3,705
At station 48000[1]	1.5	345	1,210	1,720	2,910
At station 46850[1]	1.5	350	765	1,010	1,700
At station 42950[1]	1.7	335	1,100	1,620	2,755
At station 42600[1]	2.0	700	1,370	1,620	2,800
At station 40150[1]	2.0	470	1,090	1,620	2,765
At station 37800[1]	2.5	745	1,540	2,100	3,485
At station 36900[1]	2.5	630	1,495	2,050	3,400
At station 36000[1]	2.6	700	1,565	2,130	3,485
At station 35100[1]	2.7	0	30	223	1,037
At station 35100[1]	2.7	35	36	37	39
At station 29380[1]	3.3	45	55	130	650
At station 23200[1]	3.3	85	125	140	650
At station 19400[1]	3.7	540	790	900	1,210
At station 17750[1]	3.7	475	695	800	1,065
At station 16950[1]	3.8	500	730	840	1,120
At station 14350[1]	4.0	485	705	810	1,080
At station 12270[1]	4.1	515	750	860	1,140
At station 8400[1]	4.1	460	665	760	1,020
At station 4600[1]	4.2	10	10	20	610
FLOW PATH NO. 28 (Mesa Drain and Interceptor)					
At station 56000[2]	0.8	500	710	800	1,030
At station 55250[2]	0.8	380	610	710	910
At station 52500[2]	8.9	570	860	1,050	4,630
At station 44800[2]	16.1	820	1,590	2,800	5,370
At station 41850[2]	17.6	840	1,600	2,750	5,770
At station 39450[2]	20.2	740	830	980	1,300
At station 38050[2]	27.0	810	1,150	1,300	2,470
At station 34500[2]	27.3	860	1,120	1,270	2,520
At station 31000[2]	27.8	870	1,160	1,350	2,530
At station 28000[2]	28.0	880	1,200	1,400	2,510
At station 25100[2]	45.0	1,740[3]	3,240[3]	4,580[3]	7,560[3]
At station 25000[2]	45.0	1,290	1,940	2,400	5,630
At station 17100[2]	48.5	183	228	290	330
At station 14000[2]	49.0	183	185	200	200

[1]Feet above mouth
[2]Feet above pumping station
[3]Includes inflow from Flow Path No. 32

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLOW PATH NO. 28A (Mesa Drain Below Interceptor)					
At station 1550[1]	1.5	50[2]	340[2]	700[2]	1,700[2]
At station 3000[1]	1.6	130[2]	360[2]	770[2]	1,770[2]
At station 5630[1]	5.3	770	1,830	2,350	3,830
FLOW PATH NO. 29					
At station 14000	0.5	270	440	510	730
At station 12060	1.5	750	1,600	2,000	3,580
At station 8350	1.5	20	405	1,300	3,500
FLOW PATH NO. 30					
At station 5230	0.9	480	750	900	1,460
FLOW PATH NO. 31 (Jesuit Draw)					
At station 5960	2.1	240	370	430	1,400
At station 3770	2.3	270	540	800	1,600
At station 2210	2.5	500	950	1,200	1,800
FLOW PATH NO. 32					
At station 6600	5.0	960	2,300	3,000	6,000
FLOW PATH NO. 32A					
At station 5360	0.7	290	510	630	940
At station 2300	1.0	400	740	920	1,400
At station 840	1.4	440	1,030	1,300	2,000
FLOW PATH NO. 33 (Middle Drain)					
At station 8000	0.3	140	240	300	395
At station 6760	0.3	130	220	270	360
At station 5680	0.3	120	170	205	335
At station 5000	0.3	135	190	230	300
At station 3400	0.4	130	190	220	305
FLOW PATH NO. 34					
At mouth	0.5	310	540	660	950

[1]Feet below Mesa Drain Interceptor
[2]Includes inflow from Flow Path No. 36

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLOW PATH NO. 35					
At mouth	0.4	270	460	550	800
FLOW PATH NO. 36					
At mouth	2.5	640	1,370	1,740	2,000
FLOW PATH NO. 37 (Franklin Drain)					
At station 4220[1]	0.2	45	80	90	170
At station 2650[1]	0.3	90	160	190	350
At station 1070[1]	0.4	33	157	180	290
FLOW PATH NO. 38					
Cross section G	1.85	1,010	1,920	2,260	3,130
Cross section D	4.71	2,560	4,640	5,450	7,390
FLOW PATH NO. 38A					
Cross section B	1.97	1,330	2,280	2,650	3,520
FLOW PATH NO. 38B					
Cross section A	0.75	330	640	760	1,050
FLOW PATH NO. 39					
Cross section B	3.30	1,640	2,820	3,300	4,420
FLOW PATH NO. 39A					
Cross section B	2.80	1,640	2,820	3,300	4,420
FLOW PATH NO. 40					
Cross section D	3.48	1,680[2]	1,680[2]	1,680[2]	1,680[2]
FLOW PATH NO. 41					
Cross section F	1.77	1,050	1,191	2,250	3,050
Cross section C	3.90	1,960	4,260	5,260	7,700
FLOW PATH NO. 41A					
Cross section A	1.74	940	1,700	2,000	2,700

[1]Feet above Mesa Drain Interceptor

[2]Channel capacity controlled by culverts or bridges; lost flow analyzed separately or added to an adjacent Flow Path

BEST COPY AVAILABLE

TABLE 2 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLOW PATH NO. 42					
Cross section F	1.03	810	1,550	1,840	2,550
Cross section D	1.92	810	1,550	1,840	2,550
FLOW PATH NO. 43					
Cross section K	0.35	180	350	410	570
Cross section D	0.97	480	920	1,090	1,500
FLOW PATH NO. 44					
Cross section C	2.12	1,290	2,310	2,700	3,640
FLOW PATH NO. 45					
Cross section N	0.39	190	360	430	590
Cross section C	2.37	1,350	2,360	2,760	3,700
Cross section A	4.82	2,590	4,500	5,260	7,070
FLOW PATH NO. 45B					
Cross section B	1.17	240	470	560	760
FLOW PATH NO. 45C					
Cross section D	2.35[1]	1,390	2,360	2,750	3,650
FLOW PATH NO. 46					
Cross section A	0.54	320	600	710	980
FLOW PATH NO. 47					
Cross section A	2.07	1,460	2,600	3,030	4,070
FLOW PATH NO. 48					
Cross section A	2.62	1,790	3,050	3,550	4,740

[1]Drainage area at confluence with Flow Path 45

A summary of ponding volumes is shown in Table 3.

TABLE 3 - SUMMARY OF PONDING VOLUMES

Ponding Area Number	Local Name	Drainage Area (sq. miles)	Peak Volume (acre-feet) 10-year	50-year	100-year	500-year
P1		5.80	170	520	750	1,670
P2		4.50	134	410	590	1,300

BEST COPY AVAILABLE

TABLE 3 - SUMMARY OF PONDING VOLUMES - continued

Ponding Area Number	Local Name	Drainage Area (sq. miles)	Peak Volume (acre-feet) 10-year	50-year	100-year	500-year
P3	Scotsdale Pond	1.00	34	103	151	321
P4		0.24	8	24	36	75
P5		0.47	13	38	67	122
P6		1.10	36	105	155	310
P7		0.15	5	15	23	47
P8		0.52	18	50	75	160
P9		0.15	5	15	22	48
P10	Parkwood Basin	2.31	79*	335*	561*	1,470*
P11		0.90	30	88	131	272
P12		0.80	26	76	113	240
P13		0.70	24	71	108	220
P14		2.40	74	225	320	710
P15		3.80	114	340	500	1,100
P16		1.00	32	95	136	300

*Includes contributions from Ponding Areas P8, P9, P11, P12, and P13

A summary of peak elevation-frequency relationships for the ponding areas and several flooding sources is shown in Table 4, "Summary of Stillwater Elevations."

TABLE 4 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
PONDING AREA P1				
Approximate center	3,932.0	3,937.9	3,939.0	3,942.7
PONDING AREA P2				
Approximate center	3,934.8	3,937.1	3,938.0	3,942.9
PONDING AREA P3				
Approximate center	3,929.6	3,936.8	3,937.0	3,938.3
PONDING AREA P4				
Approximate center	3,956.9	3,963.1	3,965.0	3,968.7
PONDING AREA P5				
Approximate center	3,957.0	3,962.3	3,966.0	3,970.0

BEST COPY AVAILABLE

TABLE 4 - SUMMARY OF STILLWATER ELEVATIONS - continued

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
PONDING AREA P6				
Approximate center	3,940.8	3,943.7	3,945.0	3,947.3
PONDING AREA P7				
Approximate center	3,955.1	3,963.5	3,965.0	3,967.2
PONDING AREA P8				
Approximate center	3,959.0	3,965.8	3,969.0	3,970.2
PONDING AREA P9				
Approximate center	3,961.9	3,963.8	3,964.0	3,964.4
PONDING AREA P10				
Approximate center	3,930.1	3,941.8	3,945.0	3,951.1
PONDING AREA P11				
Approximate center	3,964.2	3,964.8	3,965.0	3,965.1
PONDING AREA P12				
Approximate center	3,965.2	3,966.8	3,967.0	3,967.2
PONDING AREA P13				
Approximate center	3,956.7	3,962.2	3,963.0	3,964.3
PONDING AREA P14				
Approximate center	3,981.3	3,983.0	3,983.0	3,983.0
PONDING AREA P15				
Approximate center	3,969.4	3,972.3	3,974.0	3,978.2
PONDING AREA P16				
Approximate center	4,000.9	4,002.2	4,003.0	4,003.1
FLOW PATH NO. 27A (Left bank lateral street flow of Flow Path No. 27)				
At Valencia Place	*	*	3,697.0	*
NORTHEAST POND				
At Donald Street	3,915.6	3,918.1	3,919.0	3,920.7

*Not determined

BEST COPY AVAILABLE

TABLE 4 - SUMMARY OF STILLWATER ELEVATIONS - continued

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
OVERLAND FLOODING				
Northwest of Arroyo 1 and north of Mulberry Avenue	3,745.5	3,747.8	3,749.0	3,750.8
LOMALAND BASIN				
Between Juan De Herrera Lateral Branch A and Lomita Drive	3,677.5	3,681.0	3,683.0	3,686.0
SHALLOW FLOODING				
East bank of Juan De Herrera Lateral Branch B between Interstate 10 and Flow Path No. 28 (Mesa Drain Interceptor)	*	*	3,668.0	*
West bank of Ysleta Lateral at Americas Avenue	*	*	3,665.0	*
West of Flow Path No. 28 (Mesa Drain and Interceptor - Franklin Drive) at Oro Verde	*	*	3,664.0	*
MIDDLE DRAIN (Below Interceptor)				
Ponding Area 1 Inglewood Drive	*	*	3,665.0	*
Ponding Area 2 Approximate center	*	*	3,664.0	*
PLAYA LATERAL				
Approximately 300 feet southeast of Zaragosa Road	3,661.2	3,661.9	3,662.0	3,663.4
Shallow flooding west of Flow Path No. 27 at Knights Drive	*	*	3,677.0	*

*Not determined

BEST COPY AVAILABLE

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Digitized cross sections were obtained from topographic maps compiled in August 1973, March 1976, and May 1980 (References 15, 16, and 17). Additional cross sections were obtained during field surveys. Elevation data and structural geometry of dams, bridges, and culverts were obtained from field surveys, COE publications, the Texas Highway Department, and the City of El Paso.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1).

Along certain portions of Upper Valley Area and Arroyo 2, a profile base line is shown on the maps to represent channel distances as indicated on the flood profiles.

Generally, water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 18). Exceptions to this are mentioned in succeeding paragraphs. Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Flow conditions in the arroyos in the northwestern area of El Paso are in the unstable range and often vary from the subcritical to supercritical range. These conditions are typified by standing waves, hydraulic jumps, and variable velocities. Channels are natural, non-uniform, and often cross alluvial fans. A typical flow may follow any of numerous new paths after sedimentation.

Starting water-surface elevations for each sub-basin in the northwestern valley area were established by a rating curve using the appropriate control section such as streets, railroads, and levees. Subsequent elevations were obtained by the Modified Puls method to route hydrographs through ponding areas, and the hydrographs were lagged for the short flow reaches using Manning equations. Water-surface elevations in the individual arroyos were started using the elevations established by routing procedures or critical depth, whichever controlled. The Montoya Drain gates are assumed closed for this study.

For the northwestern area, roughness factors (Manning's "n") varied from 0.015 to 0.060 for channel areas and from 0.040 to 0.060 for overbank areas.

BEST COPY AVAILABLE

Initial computations indicated that none of the channels in the northeastern area would carry flows of the magnitude considered in this study. Cultural development and street alignment were considered in this study and often dictated the direction and severity of flooding. Of particular significance is the extensive use of stone wall fencing throughout the northeastern area. A stone wall was considered effective to 40 percent of its height in areas where flow impinged directly on the wall and 60 percent where flow was parallel.

The interchange of significant quantities of flow between flow paths alters the hydrologic characteristics of the total drainage system. The inflow and outflow locations were so numerous and the problem of routing and balancing flows so complex that it became necessary to adopt a simplified procedure to adjust the flow balance. Backwater computations, based on the HEC-2 program, were made for each independent flow path using a random range of enveloping discharges. At the point of flow separation, rating curves were constructed and added to obtain a composite rating. This procedure provided a method to proportion flows in each flow path. The HEC-1 computer runs used to formulate the hydrology were examined and revised to account for the adjusted contributing sub-areas and relocation of concentration points. Primarily, the revised methodology consists of adjusting the peak flows by adding or deducting flow gains or losses between flow paths.

Roughness factors generally ranged from 0.050 to 0.070 in undeveloped areas. Channel "n" values averaged 0.035. Streets and yards combined were assigned values varying from 0.025 to 0.040, dependent on the proportionate widths of paving and degree of vegetation and obstructions.

Water-surface elevations in closed ponding areas were established by applying runoff to volume-stage relationships. Starting water-surface elevations for the southernmost stream system of the northeastern area were established by normal depth computations. Subsequent elevations were obtained using the HEC-2 computer program. Due to steep slopes and loss of control, water-surface elevations on other streams were started using critical depth as established by the HEC-2 program. Where flow divided at tributaries or at overflow areas, starting water-surface elevations were established using the composite rating curve technique.

The study in the central portion of El Paso included channel and street flows. These two phenomena were analyzed separately because of critical flow conditions along all streets, although the upper reaches of the channel systems also exhibited a tendency toward critical flow. In all cases, profiles along channel flow segments were determined using the HEC-2 computer program. For street flow reaches (where flow is confined largely to streets), profiles were determined from representative cross sections to reach segments. Based on field data and verification of aerial photographs, the sidewalk widths were selected and added onto each

BEST COPY AVAILABLE

side of the street. All remaining sections of the cross section were blocked out because of walls or structures which would obstruct flows. Roughness factors used in the central area ranged from 0.060 for street flow to 0.035 for channel flow.

Starting water-surface elevations were determined from reservoir routing results, whenever a flow detention area was encountered, and from normal depth if the channel discharge was unobstructed. Critical depth was used for starting conditions whenever slopes equal to or greater than critical prevailed.

In some instances along the alluvial fan, there existed the potential for flow losses to side streets and eventual dispersion down the fan. Since no definitive method for analysis of this phenomenon is possible, it was assumed that no accounting for these losses would be attempted, and no reduction in flows would be utilized.

For those areas along Franklin Canal and downstream of Interstate 10, it was assumed that the storm sewers would be flowing near capacity. Consequently, the entire flow hydrograph routed to the Franklin Canal was stored in depressions which are prevalent throughout that area of central El Paso, and flooding was determined for standing, rather than flowing, water.

The southeastern portion of El Paso can be broken down into three distinctively different geographical-hydraulic sub-areas - closed basins, bluffline, and valley. Floods generated in the closed basins do not enter any surface water system. Flow from the bluffline system originates north of Interstate 10 and intersects the freeway along southwesterly-oriented courses. The streams lose definition after leaving the escarpment and entering the system. Some intermediate storage basins are located throughout the stream system. The valley area is located below the escarpment and north of the Rio Grande River. It contains well-defined drains which direct combined local flow and flow from the escarpment to the south-southeast.

In the closed basin areas, the volume of runoff generated by a particular drainage area was determined from generalized relations of flood volume generated versus drainage area for the El Paso area. A family of curves was developed using runoff hydrograph data from the hydrologic investigation. Curves were constructed for each of the 10-, 50-, 100-, and 500-year floods for undeveloped areas, medium-density areas, and basins with a high degree of development.

The streams flowing southwest toward the bluffline cross under or over a number of obstructions along their flow paths. Hydrographs were calculated at various points along each stream. These hydrographs were

BEST COPY AVAILABLE

routed downstream and combined, passing through detention basins, culverts, or other restrictions until the floodwaters reached the valley area where the flows integrated into the valley system.

The combining and routing option of the HEC-1 computer program was used exclusively for the hydrologic analysis on all streams in the valley area. At all obstructions, water-surface elevations as a result of ponding controlled until backwater calculations exceeded the ponding depths. All elevations of floodwaters upstream of all conduits were rated by Modified Puls using the HEC-1 program.

Roughness factors generally ranged from 0.050 to 0.070 in undeveloped areas. Channel "n" values averaged 0.035. Streets and yards combined were assigned values varying from 0.025 to 0.040, dependent on the proportionate widths of paving and degree of vegetation and obstructions.

Starting water-surface elevations were determined from reservoir routing results whenever a detention area was encountered, and normal depth for unobstructed channel reaches. Critical depth ratings, established using normal manual computations, were used for slopes equal to or greater than critical.

Shallow flooding areas covered a large part of the city. When shallow flooding is associated with arroyos or flow paths, they are presented in this study with flood profiles. Although several flood profiles for these shallow flooding areas indicate that the base flood elevations are more than 3 feet above the streambed, the actual flooding affecting these areas meet the shallow flooding criteria because most of the channels are narrow and, in some cases, not very well defined. Also, the overbank areas are of higher elevations, making the actual water depths 3 feet or less.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD) (subtract 8.462 feet from NGVD elevations to convert to El Paso city datum). Elevation reference marks used in this study are shown on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For the areas studied by approximate methods, the extent of the 100-year flood was determined from topographic maps and aerial photographs (References 15, 16, 19, 20, and 21). Depths of flow and flood boundaries

BEST COPY AVAILABLE

were determined by obtaining representative sections and limiting the width based on probable recent flow paths identified from aerial photography and by examining and comparing to an alluvial fan studied by detailed methods.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps (References 15, 16, 17, 19, 20, and 21).

For the areas studied by approximate methods, the boundary of the 100-year flood was delineated using topographic maps (References 15, 16, 19, 20, and 21).

The 100- and 500-year flood plain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

Non-uniform channels, steep slopes that cause high velocities, the numerous split and divided flow patterns, and ponding areas prevent the customary floodway analyses on the arroyos and flow paths. Another complication is that many of the channels are of low capacity and are perched above the flood plain areas. Therefore, it is recommended that no encroachment be allowed in the 100-year flood plain for these areas.

BEST COPY AVAILABLE

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail in the City of El Paso.

5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following tabulation for more than 20 percent of the reach:

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the City of El Paso are shown on the Flood Profiles (Exhibit 1) and summarized in Table 5.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest one-half foot, multiplied by 10, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, it is rounded to the nearest whole foot.

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Arroyo 1							
Reach 1	21,22	-0.9	-0.2	+0.4	010	A2	Varies
Reach 2	22	-10.8	-3.6	+10.7	110	A21	3,988
Reach 3	17,22	-0.8	-0.2	+0.4	010	A2	Varies
Arroyo 1A							
Reach 1	22	-0.8	-0.2	+0.3	010	A2	Varies
Arroyo 2							
Reach 1	21,22, 26	-0.9	-0.2	+0.5	010	A2	Varies
Reach 2	21,22	-10.9	-2.9	+10.1	110	A21	3,886
Reach 3	22,23	-0.9	-0.2	+0.5	010	A2	Varies
Arroyo 2A							
Reach 1	22	-10.9	-2.9	+10.1	110	A21	3,886
Reach 2	22	-0.9	-0.2	+0.5	010	A2	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

ARROYO 1 - ARROYO 1A - ARROYO 2 - ARROYO 2A

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Arroyo 3							
Reach 1	21,26	-1.2	-0.1	+0.5	010	A2	Varies
Reach 2	21,26, 27	-0.4	-0.1	+0.2	005	A1	Varies
Reach 3	22,27	-8.8	-3.4	+9.3	090	A18	3,886
Reach 4	22,27	-0.5	0.0	+0.1	005	A1	Varies
Reach 5	22	-5.0	-0.1	+0.3	050	A10	Varies
Reach 6	22	-1.1	0.0	+0.1	010	A2	Varies
Reach 7	22	-4.4	-0.7	+0.4	045	A9	Varies
Reach 8	22	-0.9	-0.1	0.0	010	A2	Varies
Reach 9	22	-3.8	-0.8	0.0	040	A8	Varies
Reach 10	22	-1.5	-0.5	+0.5	015	A3	Varies
Reach 11	22	-2.2	-1.0	+1.2	020	A4	Varies
Reach 12	22	-0.9	-0.3	+0.4	010	A2	Varies
Shallow Flooding							
Ponding Area 1	22	*	*	*	*	AH	Varies
Ponding Area 2	22	*	*	*	*	AH	Varies
Ponding Area 3	22	*	*	*	*	AH	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

36

ARROYO 3 - SHALLOW FLOODING

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FNF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Arroyo 3A							
Reach 1	22	-2.4	-0.7	+1.1	025	A5	Varies
Arroyo 3B							
Reach 1	22	-8.8	-3.4	+9.3	090	A18	3,886
Reach 2	22	-1.0	-0.2	+0.5	010	A2	Varies
Arroyo 4							
Reach 1	26,27	-4.5	-1.7	+8.9	045	A9	3,776
Reach 2	27	-0.5	-0.2	+0.2	005	A1	Varies
Reach 3	27	-8.7	-0.3	+0.6	085	A17	4,127
Reach 4	22,27	-0.8	-0.1	+0.5	010	A2	Varies
Arroyo 5							
Reach 1	27	-0.5	-0.1	+0.2	005	A1	Varies
Reach 2	27	-7.4	-1.2	+0.4	075	A15	3,975

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

37

ARROYO 3A - ARROYO 3B - ARROYO 4 - ARROYO 5

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Arroyo 6							
Reach 1	27	-1.0	-0.3	+0.6	010	A2	Varies
Reach 2	27	-2.8	-0.9	+0.6	030	A6	Varies
Reach 3	23,27, 28	-0.8	-0.3	+0.7	010	A2	Varies
Arroyo 6A							
Reach 1	22,23, 27	-0.7	-0.2	+0.8	005	A1	Varies
Arroyo 6B							
Reach 1	22,23, 27	-1.0	-0.3	+1.3	010	A2	Varies
Arroyo 7							
Reach 1	27	-1.0	-0.3	+0.7	010	A2	Varies
Reach 2	27	-2.2	-0.7	+2.3	020	A4	Varies
Reach 3	27	-0.7	-0.2	+1.0	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

ARROYO 6 - ARROYO 6A - ARROYO 6B - ARROYO 7

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FMF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Arroyo 8							
Reach 1	27	-19.7	-7.5	+23.0	200	A30	3,852
Reach 2	27	-1.3	-0.4	+0.9	015	A3	Varies
Reach 3	27	-0.6	-0.1	+0.6	005	A1	Varies
Reach 4	27	-1.0	-0.2	+1.2	010	A2	Varies
Arroyo 8A							
Reach 1	27	-0.7	0.0	0.9	016	A2	Varies
Reach 2	27	0.0	0.0	0.0	005	A1	Varies
Reach 3	27	-6.7	-0.9	+0.5	065	A13	Varies
Reach 4	27	-1.6	-0.4	+0.1	015	A3	Varies
Reach 5	27	-2.1	-0.8	+1.0	020	A4	Varies
Arroyo 8B							
Reach 1	27	-3.4	-1.1	+2.2	035	A7	Varies
Reach 2	27	-0.3	0.0	0.0	005	A1	Varies
Reach 3	27	-3.8	-0.9	+2.1	040	A8	Varies
Reach 4	23,27, 28	-0.6	-0.1	+0.3	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

BEST COPY AVAILABLE

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

ARROYO 8 - ARROYO 8A - ARROYO 8B

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Arroyo 8C							
Reach 1	22,23, 27	-0.5	-0.1	+0.3	005	A1	Varies
Arroyo 8D							
Reach 1	27,28	-0.5	-0.2	+0.2	005	A1	Varies
Lower Valley Area							
Reach 1	27,32	-0.1	-0.5	+2.2	040	A8	3,733
Upper Valley Area							
Reach 1	26	*	Shallow Flooding		*	AH	Varies
Reach 2	26	-0.6	-0.3	+0.2	005	A1	3,742
Reach 3	26	*	Shallow Flooding		*	AH	Varies
Reach 4	21,26	-0.5	-0.1	+0.4	005	A1	3,746
Reach 5	21	-0.6	-0.1	+0.3	005	A1	Varies
Reach 6	21	*	Shallow Flooding		*	AH	Varies
Reach 7	16,21	-0.3	-0.1	+0.1	005	A1	3,754

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map
*Not applicable in areas of shallow flooding

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

40 ARROYO 8C - ARROYO 8D - LOWER VALLEY AREA - UPPER VALLEY AREA

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Ponding Area West of Meadow Lark, North of Country Club Road	21	*	*	*	*	AH	3,749
Flow Path No. 11 Shallow Flooding Ponding Area 1	15	*	*	*	*	AH	Varies
Flow Path No. 13 (Drainage Channel No. 1)							
Reach 1	15,20	-3.4	-0.9	+1.7	035	A7	Varies
Reach 2	15	-0.6	-0.1	+0.1	005	A1	Varies
Reach 3	14	-1.7	-0.1	+0.2	015	A3	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

PONDING AREA - FLOW PATH NO. 11 - FLOW PATH NO. 13

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 13 (continued)							
Shallow Flooding							
Ponding Area 1	15,20	*	*	*	*	AH	Varies
Ponding Area 2	14,15	*	*	*	*	AH	Varies
Flow Path No. 13A							
Shallow Flooding							
Ponding Area 1	14	*	*	*	*	AH	Varies
Northeast Pond							
Reach 1	15,20	-3.4	-0.9	+1.7	035	A7	3,919
Flow Path No. 14 (Drainage Channel No. 2)							
Shallow Flooding							
Ponding Area 1	19,20	*	*	*	*	AH	Varies
Reach 1	19	-2.2	-0.6	+1.3	020	A4	Varies
Reach 2	19	-1.4	-0.5	+1.3	015	A3	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

BEST COPY AVAILABLE

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

42 FLOW PATH NO. 13 - FLOW PATH NO. 13A - NORTHEAST POND - FLOW PATH NO. 14

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FNF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 15 Shallow Flooding							
Ponding Area 1	19,20 24,25	*	*	*	*	AH	Varies
Sheet Flow Area 1	19,20		Average Depth 2 Feet			AO	--
Flow Path No. 16							
Reach 1	24,25	-1.4	-0.3	+0.6	015	A3	Varies
Flow Path No. 17 (McKelligon Canyon)							
Reach 1	28	-1.0	-0.2	+0.6	010	A2	Varies
Reach 2	28	-0.7	-0.2	+0.3	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 15 - FLOW PATH NO. 16 - FLOW PATH NO.17

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FNF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 17A (McKelligon Canyon Tributary) Reach 1	28	-0.5	-0.2	+0.3	005	A1	Varies
Overflow from Reservoir 1 Sheet Flow Area 1	28,29 33,34	Average Depth 2 Feet				AO	--
Flow Path No. 18 Reach 1	32	-0.8	-0.3	+0.8	010	A2	Varies
Flow Path No. 19 (Cement Lake) Reach 1	32	-0.3	-0.1	+0.1	005	A1	3,739

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

44

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 17A - OVERFLOW FROM RESERVOIR 1 - FLOW PATH NO. 18 - FLOW PATH NO. 19

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 20							
Reach 1	32	-1.8	-0.5	+1.0	020	A4	Varies
Reach 2	32	-1.4	-0.5	+1.0	015	A3	Varies
Reach 3	32	-4.1	-1.1	+2.4	040	A8	Varies
Reach 4	28,32, 33	-1.0	-0.2	+0.6	010	A2	Varies
Flow Path No. 20A							
Reach 1	27,28, 32	-0.8	-0.2	+0.5	010	A2	Varies
Flow Path No. 21							
Reach 1	32	-2.7	-0.9	+0.2	025	A5	Varies
Reach 2	32	-1.0	-0.3	+0.6	010	A2	Varies
Reach 3	32	-7.0	-1.9	+3.9	070	A14	3,809
Reach 4	32,33	-3.0	-1.0	+2.1	030	A6	Varies
Reach 5	33	-0.9	-0.3	+0.7	010	A2	Varies
Reach 6	33	-5.4	-3.1	+0.6	055	A11	Varies
Reach 7	33	-0.6	-0.1	+0.5	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 20 - FLOW PATH NO. 20A - FLOW PATH NO. 21

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100 YEAR) FLOOD AND			FIRM	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 21A							
Reach 1	32	-0.4	-0.2	+0.2	005	A1	Varies
Reach 2	32	-5.3	-1.0	+2.5	055	A11	3,819
Reach 3	32,33	-0.7	-0.2	+0.6	005	A1	Varies
Flow Path No. 22							
Reach 1	28	-12.5	-12.4	+0.2	130	A23	4,123
Reach 2	28,33	-1.4	-0.4	+0.4	015	A3	Varies
Reach 3	28	-0.5	-0.2	+0.4	005	A1	Varies
Flow Path No. 23							
Reach 1	39	-3.2	-0.9	+1.8	030	A6	Varies
Reach 2	39	-5.6	-2.6	+4.7	055	A11	Varies
Reach 3	39	-7.3	-3.0	+8.8	075	A15	Varies
Reach 4	39	-4.2	-1.7	+4.2	040	A8	Varies
Reach 5	39	-8.2	-1.1	+0.7	080	A16	Varies
Reach 6	33,39	-3.1	-0.8	+1.2	030	A6	Varies
Reach 7	33,39	-0.9	-0.2	+0.4	010	A2	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

BEST COPY AVAILABLE

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 21A - FLOW PATH NO. 22 - FLOW PATH NO. 23

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 24							
Reach 1	34	-0.7	-0.2	+1.2	005	A1	Varies
Shallow Flooding							
Ponding Area 1	34	*	*	*	*	AH	Varies
Flow Path No. 25							
Shallow Flooding							
Ponding Area 1	39,40	*	*	*	*	AH	3,702
Ponding Area 2	33,34						
	39,40	*	*	*	*	AH	3,705
Flow Path No. 26							
(Phelps-Dodge)							
Reach 1	41	-10.9	-4.6	+3.6	110	A21	3,750
Reach 2	41	-2.6	-0.7	+1.7	025	A5	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 24 - FLOW PATH NO. 25 - FLOW PATH NO. 26

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FIRM	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 27 (Playa Drain)							
Reach 1	48	-1.9	-0.5	+0.8	020	A4	3,666
Reach 2	44,47, 48	-1.7	-0.9	+3.0	015	A3	Varies
Reach 3	41	-5.0	-1.7	+2.0	050	A10	3,690
Shallow Flooding West of Flow Path No. 27 at Knights Drive							
Ponding Area 1	44	*	*	*	*	AH	3,677
Middle Drain (Below Interceptor)							
Ponding Area 1	50	*	*	*	*	AH	3,665
Ponding Area 2	50	*	*	*	*	AH	3,664

[1]Flood Insurance Rate Map Panel

[2]Weighted Average

[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 27 - MIDDLE DRAIN

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 27 (Playa Lateral)							
Reach 1	50	-0.9	-0.1	+1.4	010	A2	3,662
Shallow Flooding							
Ponding Area 1	49,50	*	*	*	*	AH	Varies
Ponding Area 2	41,44	*	*	*	*	AH	Varies
Ponding Area 3	40,41	*	*	*	*	AH	3,690
Flow Path No. 27A (Left Bank Lateral Street Flow to Flow Path No. 27)							
Shallow Flooding							
Ponding Area 1	40,41	*	*	*	*	AH	3,697

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 27 - FLOW PATH NO. 27A

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 28 (Mesa Drain and Interceptor)							
Reach 1	50	-0.8	-0.1	+1.4	010	A2	Varies
Reach 2	50	-1.3	-0.1	+0.3	015	A3	Varies
Reach 3	48	-2.8	-0.7	+0.7	030	A6	3,668
Reach 4	45	-2.0	-0.5	+0.8	020	A4	Varies
Reach 5	45	-2.3	-0.6	+1.2	025	A5	Varies
Reach 6	45	-1.9	-1.1	+0.5	020	A4	Varies
Shallow Flooding							
Ponding Area 1	48,50	*	*	*	*	AH	3,666
Ponding Area 2	48	*	*	*	*	AH	3,667
Ponding Area 3	45,48, 49	*	*	*	*	AH	Varies
Ponding Area 4	45	*	*	*	*	AH	Varies
Ponding Area 5	45	*	*	*	*	AH	Varies
Ponding Area 6	41,44 45	*	*	*	*	AH	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

50

FLOOD PATH NO. 28

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 28A (Mesa Drain below Interceptor) Ponding Area 1	48,49, 51	*	*	*	*	AH	Varies
Shallow Flooding West of Flow Path No. 28 (Mesa Drain and Interceptor-Franklin Drain) Ponding Area 1	50	*	*	*	*	AH	3,664

*Not applicable in areas of shallow flooding

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 28A - SHALLOW FLOODING WEST OF FLOW PATH NO. 28

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Shallow Flooding Along Franklin Drain (Below Flow Path No. 28 Mesa Drain and Interceptor)							
Ponding Area 1	50,52	*	*	*	*	AH	Varies
Flow Path No. 29 Reach 1	41,42	-1.3	-0.3	+1.0	015	A3	Varies
Shallow Flooding Sheet Flow Area 1	41		Average Depth 2 Feet			AO	---

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

52

SHALLOW FLOODING ALONG FRANKLIN DRAIN - FLOW PATH NO. 29

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FNF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 30							
Reach 1	45	-0.8	-0.4	+1.4	010	A2	Varies
Reach 2	45	0.0	0.0	0.0	005	A1	Varies
Reach 3	45	-1.0	-0.4	+1.1	010	A2	Varies
Flow Path No. 31 (Jesuit Draw)							
Reach 1	45	-1.0	-0.4	+1.7	010	A2	Varies
Lomaland Basin							
Reach 1	45	-5.5	-2.0	+3.0	055	A11	3,683
Flow Path No. 32							
Reach 1	45,46, 48	-1.4	-0.5	+1.0	015	A3	Varies
Flow Path No. 32A							
Reach 1	45,46	-0.9	-0.3	+0.7	010	A2	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 30 - FLOW PATH NO. 31 - LOMALAND BASIN - FLOW PATH NO. 32 - FLOW PATH NO. 32A

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 33 (Middle Drain) Shallow Flooding							
Ponding Area 1	48	*	*	*	*	AH	3,667
Ponding Area 2	48	*	*	*	*	AH	3,670
Flow Path No. 36 Reach 1	49	-0.9	-0.3	+0.5	010	A2	Varies
Flow Path No. 37 (Franklin Drain) Shallow Flooding							
Ponding Area 1	48,50	*	*	*	*	AH	Varies
Shallow Flooding East Bank of Juan de Herrera Lateral Branch B							
Ponding Area 1	48,49	*	*	*	*	AH	3,668

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

54

FLOW PATH NO. 33 - FLOW PATH NO. 36 - FLOW PATH NO. 37 - SHALLOW FLOODING EAST BANK OF JUAN DE HERRERA LATERAL BRANCH B

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 38A							
Reach 1	17	-0.8	-0.1	+0.4	010	A2	Varies
Flow Path No. 38B							
Reach 1	16, 17	-0.7	-0.1	+0.3	005	A1	Varies
Flow Path No. 39							
Reach 1	16, 17	-0.9	-0.2	+0.5	010	A2	Varies
Flow Path No. 39A							
Reach 1	16, 17	-0.7	-0.2	+0.4	005	A1	Varies
Flow Path No. 40							
Reach 1	16	*	*	*	*	AH	Varies
Reach 2	11, 12, 16, 17	-0.9	-0.2	+0.3	010	A2	Varies
Flow Path No. 41							
Reach 1	11, 12	-1.0	-0.3	+0.4	010	A2	Varies
Flow Path No. 41A							
Reach 1	12	-0.5	-0.1	+0.2	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 38A - FLOW PATH NO. 38B - FLOW PATH NO. 39 - FLOW PATH NO. 39A - FLOW PATH NO. 40 - FLOW PATH NO. 41 - FLOW PATH NO. 41A

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 42							
Reach 1	11, 12	-0.7	-0.1	+0.4	005	A1	Varies
Flow Path No. 43							
Reach 1	11, 12	-0.5	-0.1	+0.2	005	A1	Varies
Flow Path No. 44							
Reach 1	06, 11, 12	-0.9	-0.2	+0.4	010	A2	Varies
Flow Path No. 45							
Reach 1	06	-0.8	-0.2	+0.4	010	A2	Varies
Reach 2	06, 12	-0.7	-0.2	+0.3	005	A1	Varies
Flow Path No. 45B							
Reach 1	06	-0.7	-0.2	+0.3	005	A1	Varies
Flow Path No. 45C							
Reach 1	06	-0.9	-0.1	+0.3	010	A2	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

56

FLOW PATH NO. 42 - FLOW PATH NO. 43 - FLOW PATH NO. 44 - FLOW PATH NO. 45 - FLOW PATH NO. 45B - FLOW PATH NO. 45C

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flow Path No. 46 Reach 1	06	-0.8	-0.2	+0.3	010	A2	Varies
Flow Path No. 47 Reach 1	01,06	-0.8	-0.2	+0.4	010	A2	Varies
Flow Path No. 48 Reach 1	01	-1.1	-0.3	+0.5	010	A2	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

FLOW PATH NO. 46 - FLOW PATH NO. 47 - FLOW PATH NO. 48

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Ponding Area West of Montoya Main Lateral and East of River Bend Drive	26	*	*	*	*	AH	3,742
Ponding Area Along the Montoya Drain Channel upstream of Rosemont Drive	21,26	*	*	*	*	AH	Varies
Ponding Area North of Country Club Road, South of Lindberg Avenue, East of Meadow Lark	21	*	*	*	*	AH	3,748

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

BEST COPY AVAILABLE

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

5F

PONDING AREA

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FNF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Shallow Flooding West Bank of Ysleta Lateral Ponding Area 1	48,50	*	*	*	*	AH	3,665
Ponding Areas							
P1	30,31	-7.0	-1.1	+3.7	070	A14	3,939
P2	30,35, 36	-3.2	-0.9	+4.9	030	A6	3,938
P3	36	-7.4	-0.2	+1.3	075	A15	3,937
P4	36	-8.1	-1.9	+3.7	080	A16	3,965
P5	36	-9.0	-3.7	+4.0	090	A18	3,966
P6	36,42	-4.2	-1.3	+2.3	040	A8	3,945
P7	36	-9.9	-1.5	+2.2	100	A20	3,965
P8	36	-10.0	-3.2	+1.2	100	A20	3,969
P9	42	-2.1	-0.2	+0.4	020	A4	3,964
P10	42	-14.9	-3.2	+6.1	150	A25	3,945
P11	42	-0.8	-0.2	+0.1	010	A2	3,965
P12	42	-1.8	-0.2	+0.2	020	A4	3,967

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

SHALLOW FLOODING WEST BANK OF YSLETA LATERAL — PONDING AREAS

BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Ponding Areas (continued)							
P13	42	-6.3	-0.8	+1.3	065	A13	3,963
P14	37	-1.7	0.0	0.0	015	A3	3,983
P15	37,43	-4.6	-1.7	+4.2	045	A9	3,974
P16	43,46	-2.1	-0.8	+0.1	020	A4	4,003
Runoff Sheet Flow Area Between Lee Trevino Drive and Ponding Areas P11 and P12	42		Average Depth 2 Feet		--	A0	
Flow Path No. 38 Reach 1	16,17	-0.8	-0.2	+0.4	010	A2	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

*Not applicable in areas of shallow flooding

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX

(EL PASO CO.)

FLOOD INSURANCE ZONE DATA

60 PONDING AREAS - RUNOFF SHEET FLOW AREA BETWEEN LEE TREVINO DRIVE AND PONDING AREAS P11 AND P12 - FLOW PATH NO. 38

BEST COPY AVAILABLE

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF, and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zone AO:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths are shown but no FHFs are determined.
Zone AH:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; base flood elevations are shown, but no FHFs are determined.
Zones A1,A2,A3,A4 A5,A6,A7,A8,A9,A10, A11,A13,A14,A15, A16,A17,A18,A20, A21,A23, and A25:	Special Flood Hazard Areas inundated by the 100-year flood; with base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- or 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding; not subdivided.
Zone D:	Areas of undetermined, but possible flood hazard.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the community are shown in Table 5.

BEST COPY AVAILABLE

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of El Paso is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevations. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

A report on survey of flood control in El Paso County and three design memorandums for the City of El Paso were prepared by the COE (References 5, 6, 7, and 8). The basic hydrology data prepared in the design memorandums were used in this study. However, the peak discharges determined in the design memorandums differ from those developed in this study because the discharges in the design memorandums were adjusted for expected probability, while they were not adjusted in this study. Due to a more detailed analysis, the unit hydrographs developed for this study differ from those in Design Memorandum No. 2. Since both studies were performed by the COE, reconciliation of this difference was made within the agency.

This study supersedes the currently effective Flood Insurance Study for the City of El Paso (Reference 22).

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, Regional Director, Region VI Office, Federal Center, Denton, Texas 76201.

8.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Department of Commerce, Bureau of the Census, 1970 Census of Population, Number of Inhabitants, Texas, Washington, D. C., U. S. Government Printing Office, 1971.

2. U. S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Texas, Washington, D. C., U. S. Government Printing Office, 1981.

BEST COPY AVAILABLE

3. El Paso Times, El Paso, Texas, August 4, 1966.

4. U. S. Army Corps of Engineers, Albuquerque District, Letter Report, Reconnaissance of Arroyos Flood at El Paso, Texas, August 3, 1966, Albuquerque, New Mexico, August 15, 1966.

5. U. S. Army Corps of Engineers, Albuquerque District, Report of Survey for Flood Control and Allied Purposes, El Paso County, Texas, Albuquerque, New Mexico, January 1964.

6. U. S. Army Corps of Engineers, Albuquerque District, El Paso Local Protection Project, El Paso, Texas, and Vicinity, Central Area, Design Memorandum No. 1, Hydrology, Albuquerque, New Mexico, November 1967.

7. U. S. Army Corps of Engineers, Albuquerque District, El Paso Local Protection Project, El Paso, Texas, and Vicinity, Copper System, Design Memorandum No. 2, Hydrology, Albuquerque, New Mexico, June 1968.

8. U. S. Army Corps of Engineers, Albuquerque District, El Paso Local Protection Project, El Paso, Texas, and Vicinity, Northwest Area, Design Memorandum No. 9, Hydrology, Albuquerque, New Mexico, April 1972.

9. U. S. Army Corps of Engineers, Hydrologic Engineering Center, Flood Hydrograph Analyses and Computations, EMW 1110-2-1405, Davis, California, August 1959.

10. U. S. Department of Commerce, National Oceanic and Atmospheric Administration, Technical Memorandum, NWS Hydro-35, Five- to 60-Minute Precipitation Frequency for the Eastern and Central United States, Washington, D. C., June 1977.

11. Water Resources Council, "A Uniform Technique for Determining Flood Flow Frequency", Bulletin 15, Washington, D. C., December 1967.

12. U. S. Army Corps of Engineers, Hydrologic Engineering Center, Routing of Floods Through River Channels, Manual, EMW 1110-2-1408, Davis, California, March 1960.

13. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, Davis, California, January 1973.

14. U. S. Department of Agriculture, Soil Conservation Service, 2-Year 6-Hour Precipitation, New Mexico, NM-N-0374, January 1971.

15. Koogle and Pouls Engineering, Inc., of Albuquerque, New Mexico, Aerial Survey, Northwest Area, Scale 1"=200', August 1973.

BEST COPY AVAILABLE

16. United Aerial Mapping, Inc., of San Antonio, Texas, Aerial Survey, Northeast, Central, and Southeast Areas, Scale 1"=500', Contour Interval 2 Feet, March 1976.

17. Williams-Stackhouse, Inc., of San Antonio, Texas, Aerial Survey, Northwest Area, Scale 1"=400', Contour Intervals 2 and 4 Feet, May 1980.

18. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, June 1974.

19. Aero Service Corporation (Mid Continent) of Tulsa, Oklahoma, Aerial Survey, Northwest Area, Scale 1"=500', Contour Intervals 5 and 10 Feet, January 1956.

20. U. S. Army Corps of Engineers, Albuquerque District, Aerial Survey, Central Area, Scale 1"=100', Contour Interval 2 Feet, August 1974.

21. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Anthony, Texas, 1955; Canutillo, Texas, 1955, Photorevised 1967; El Paso, Texas, 1955, Photorevised 1973; Smeltertown, Texas, 1955, Photorevised 1973.

22. Federal Emergency Management Agency, Flood Insurance Study, City of El Paso, El Paso County, Texas, Washington, D. C., October 15, 1982.

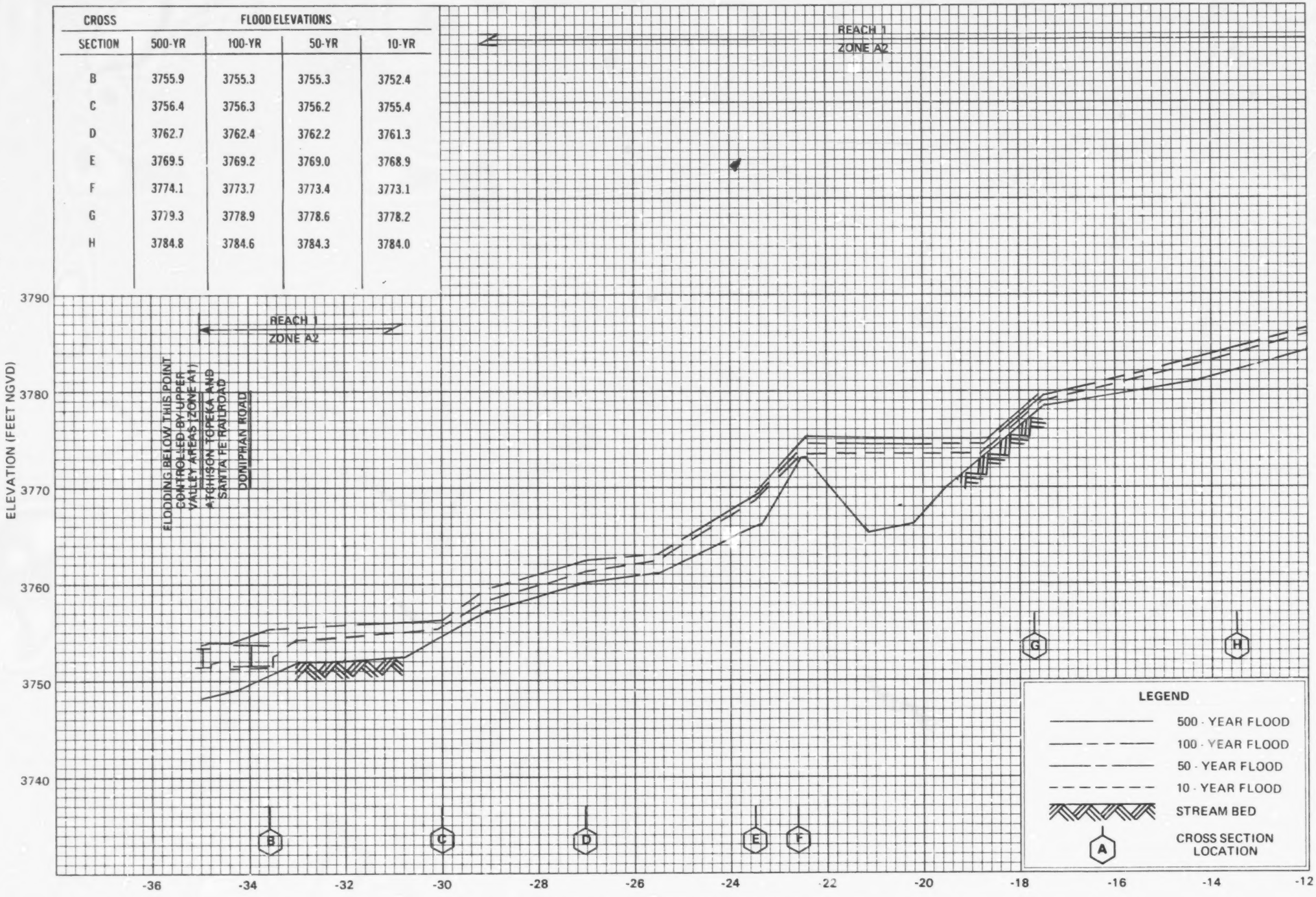
BEST COPY AVAILABLE

BLANK PAGE

BLANK PAGE

BLANK PAGE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
B	3755.9	3755.3	3755.3	3752.4
C	3756.4	3756.3	3756.2	3755.4
D	3762.7	3762.4	3762.2	3761.3
E	3769.5	3769.2	3769.0	3768.9
F	3774.1	3773.7	3773.4	3773.1
G	3779.3	3778.9	3778.6	3778.2
H	3784.8	3784.6	3784.3	3784.0



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

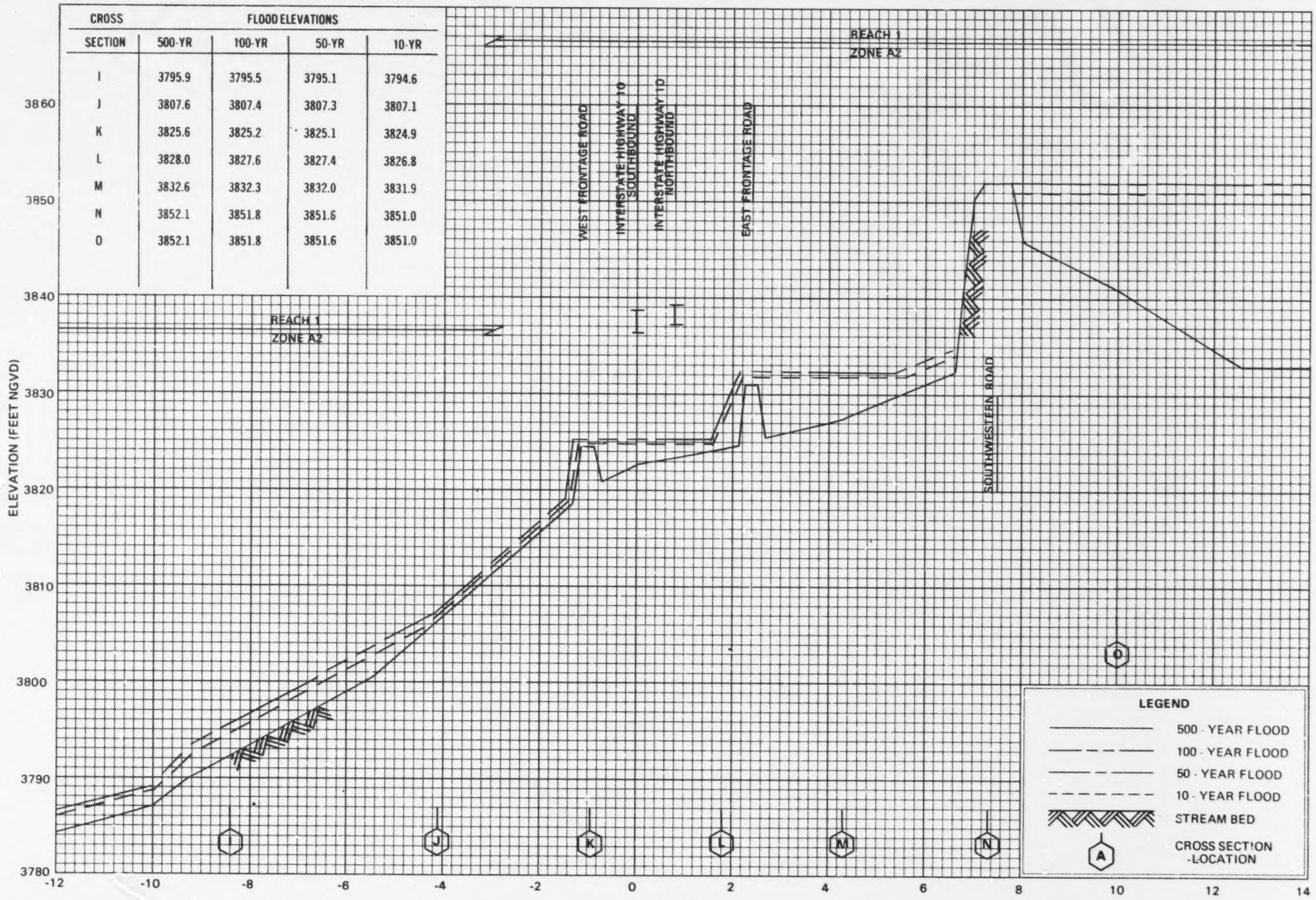
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

01P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
I	3795.9	3795.5	3795.1	3794.6
J	3807.6	3807.4	3807.3	3807.1
K	3825.6	3825.2	3825.1	3824.9
L	3828.0	3827.6	3827.4	3826.8
M	3832.6	3832.3	3832.0	3831.9
N	3852.1	3851.8	3851.6	3851.0
O	3852.1	3851.8	3851.6	3851.0



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

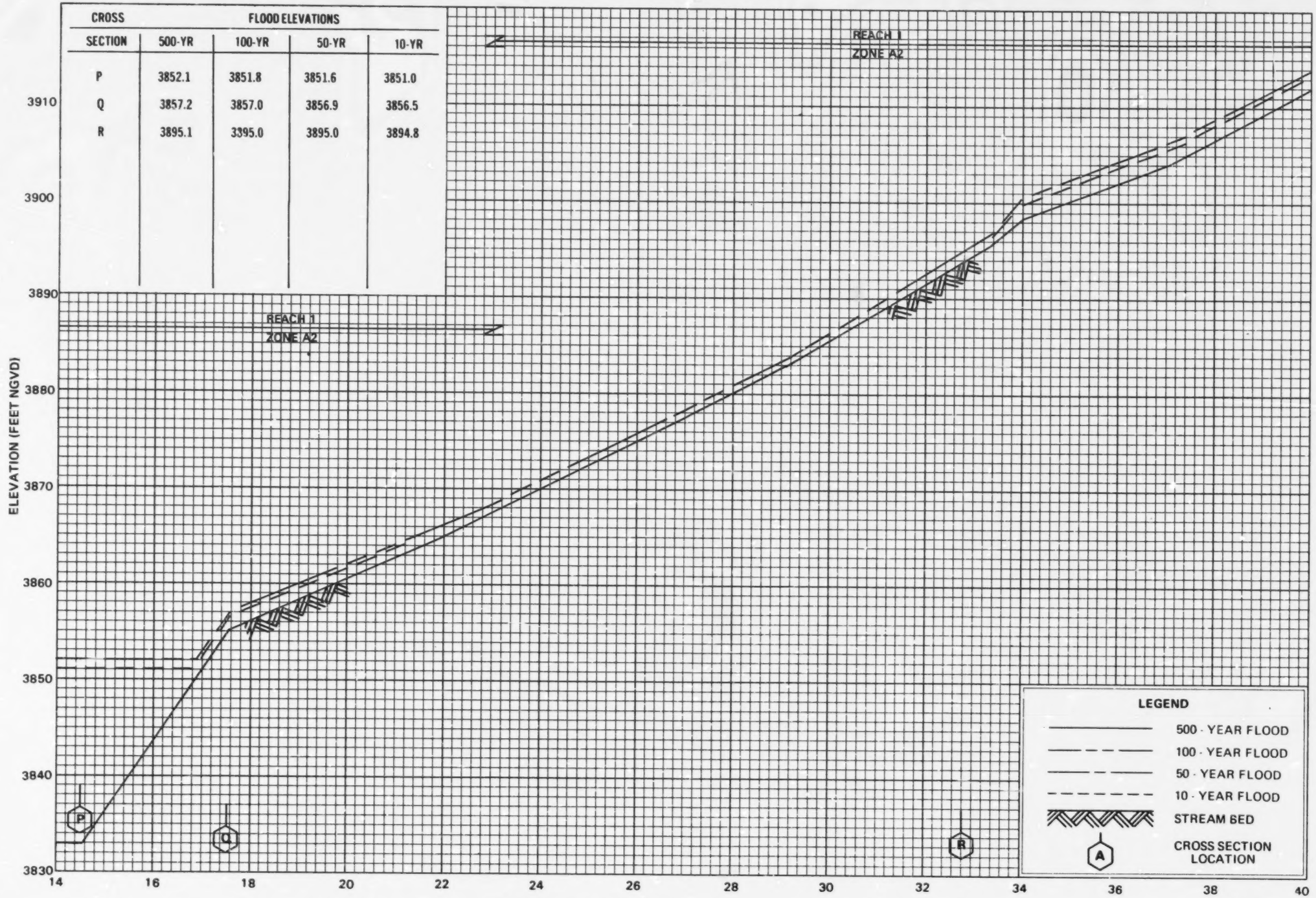
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

02P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
P	3852.1	3851.8	3851.6	3851.0
Q	3857.2	3857.0	3856.9	3856.5
R	3895.1	3395.0	3895.0	3894.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

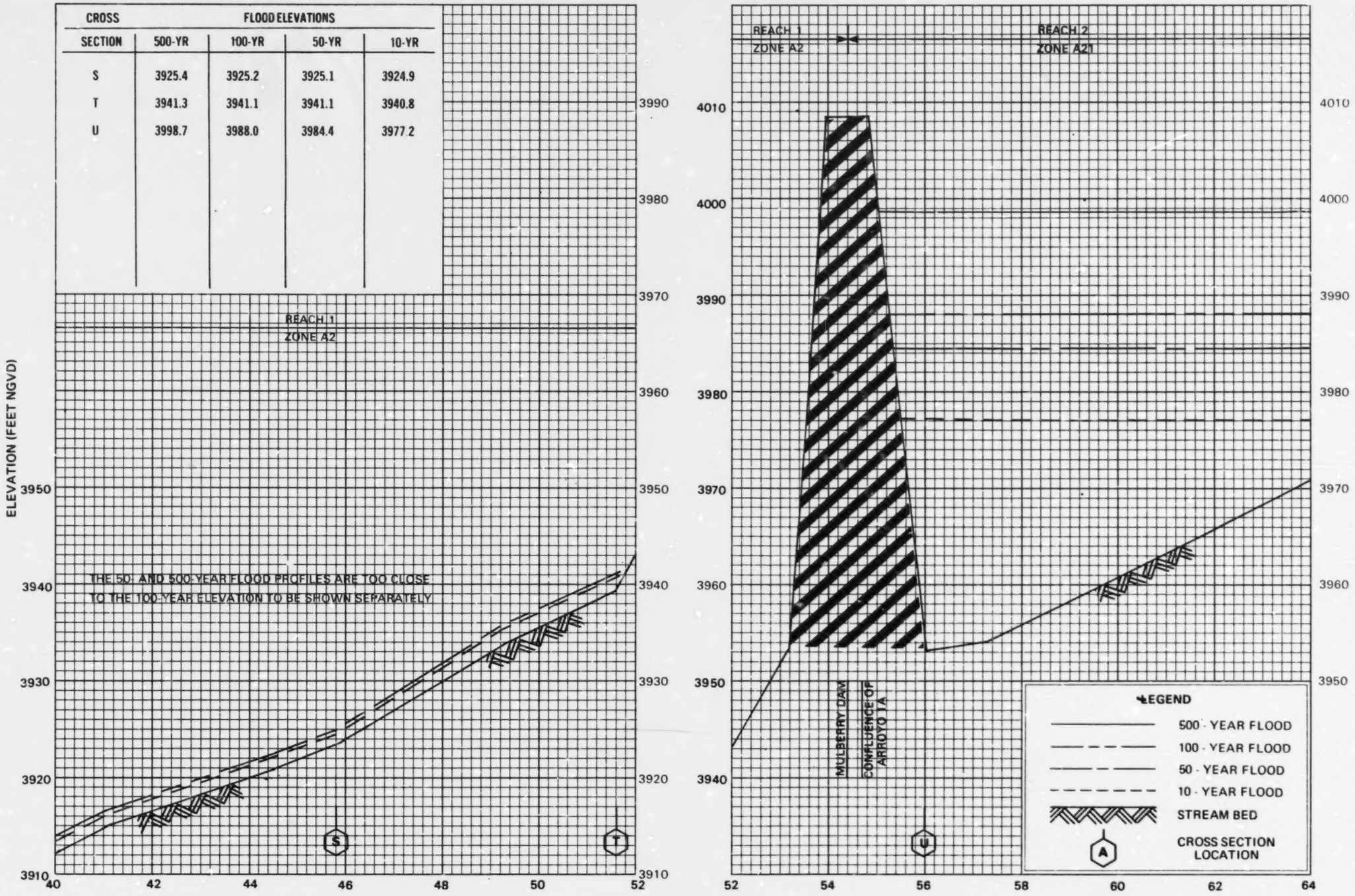
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

03P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
S	3925.4	3925.2	3925.1	3924.9
T	3941.3	3941.1	3941.1	3940.8
U	3998.7	3988.0	3984.4	3977.2



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

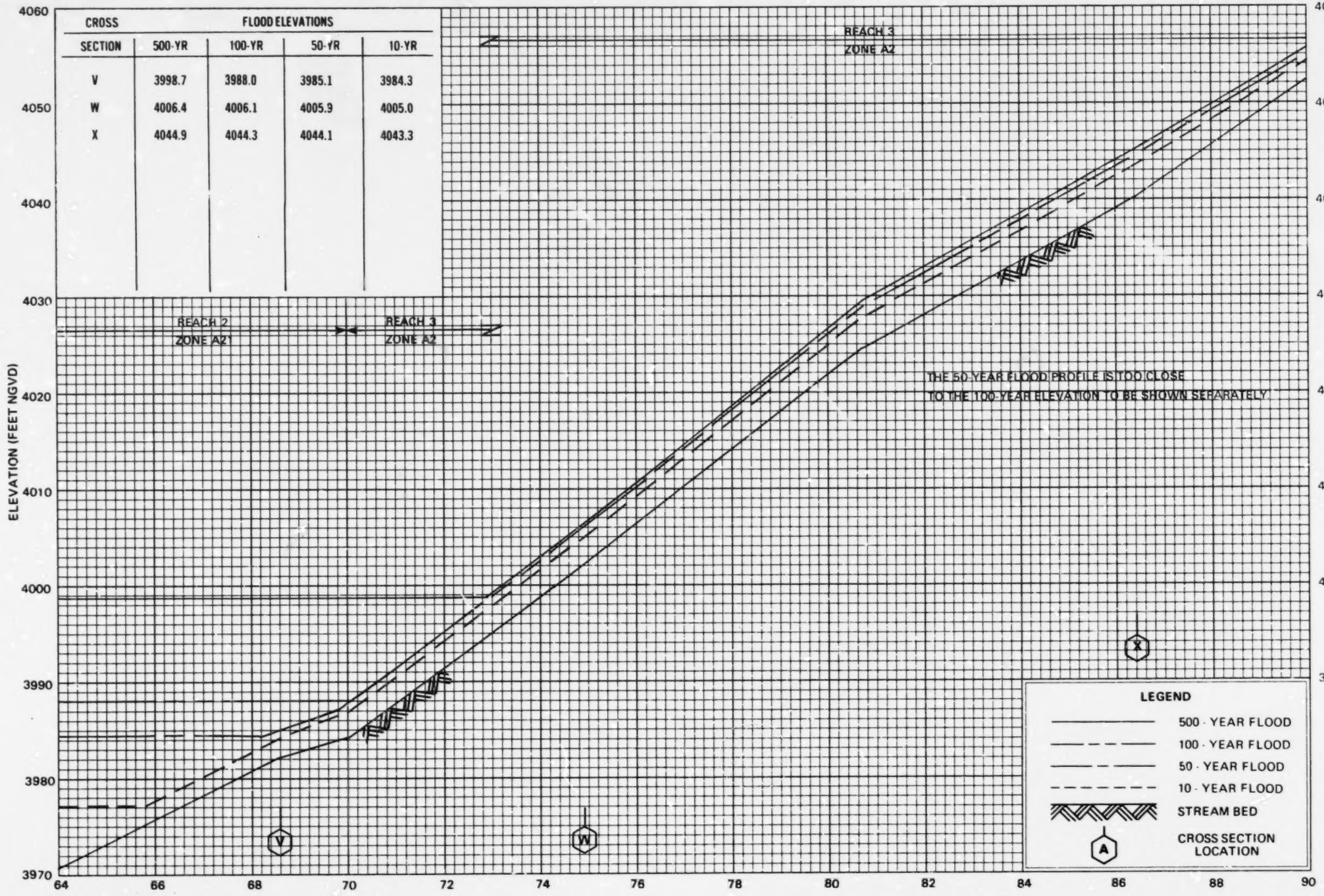
CITY OF EL PASO, TX

(EL PASO CO.)

04P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
V	3998.7	3988.0	3985.1	3984.3
W	4006.4	4006.1	4005.9	4005.0
X	4044.9	4044.3	4044.1	4043.3



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

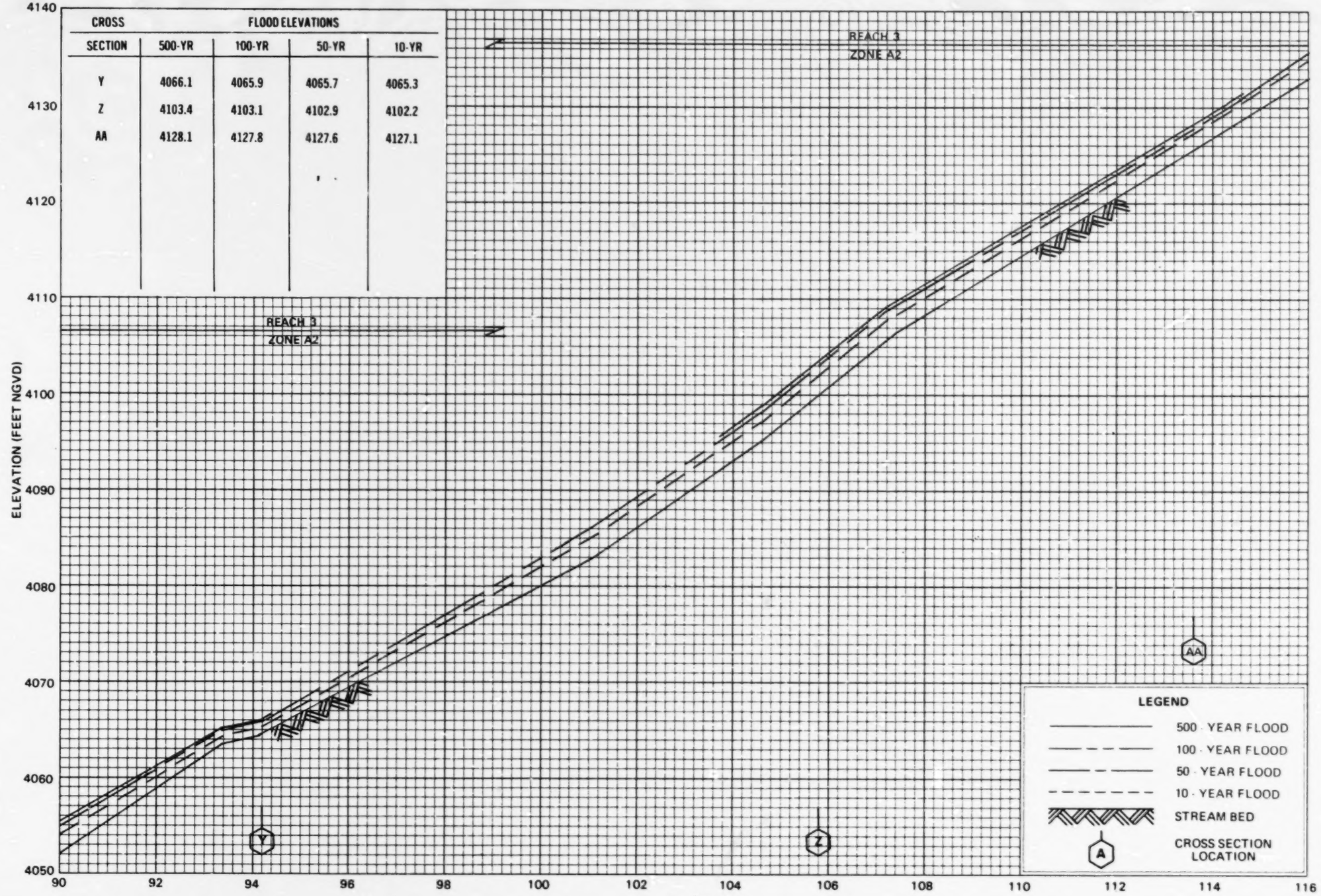
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

05P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
Y	4066.1	4065.9	4065.7	4065.3
Z	4103.4	4103.1	4102.9	4102.2
AA	4128.1	4127.8	4127.6	4127.1



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

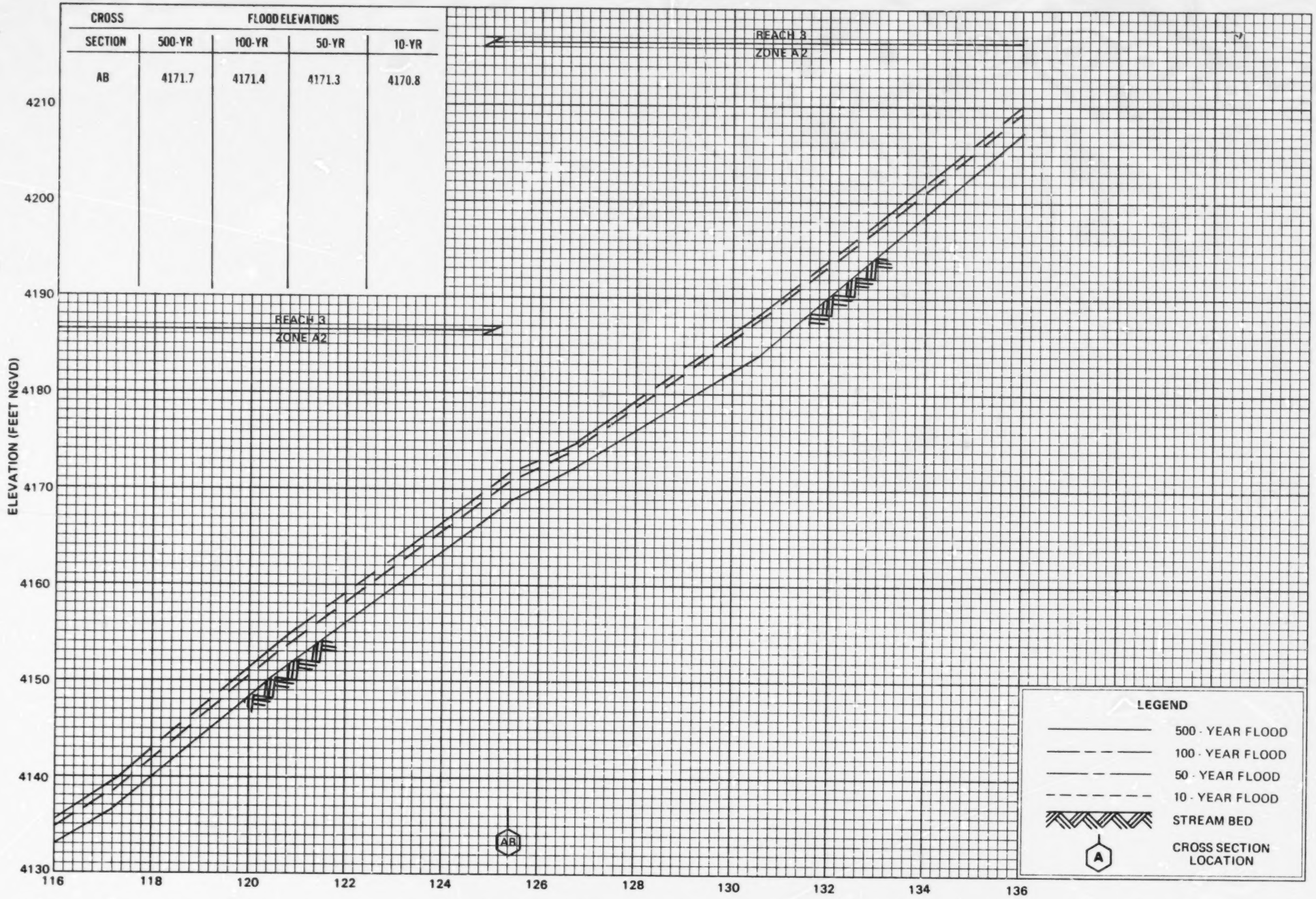
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

06P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AB	4171.7	4171.4	4171.3	4170.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

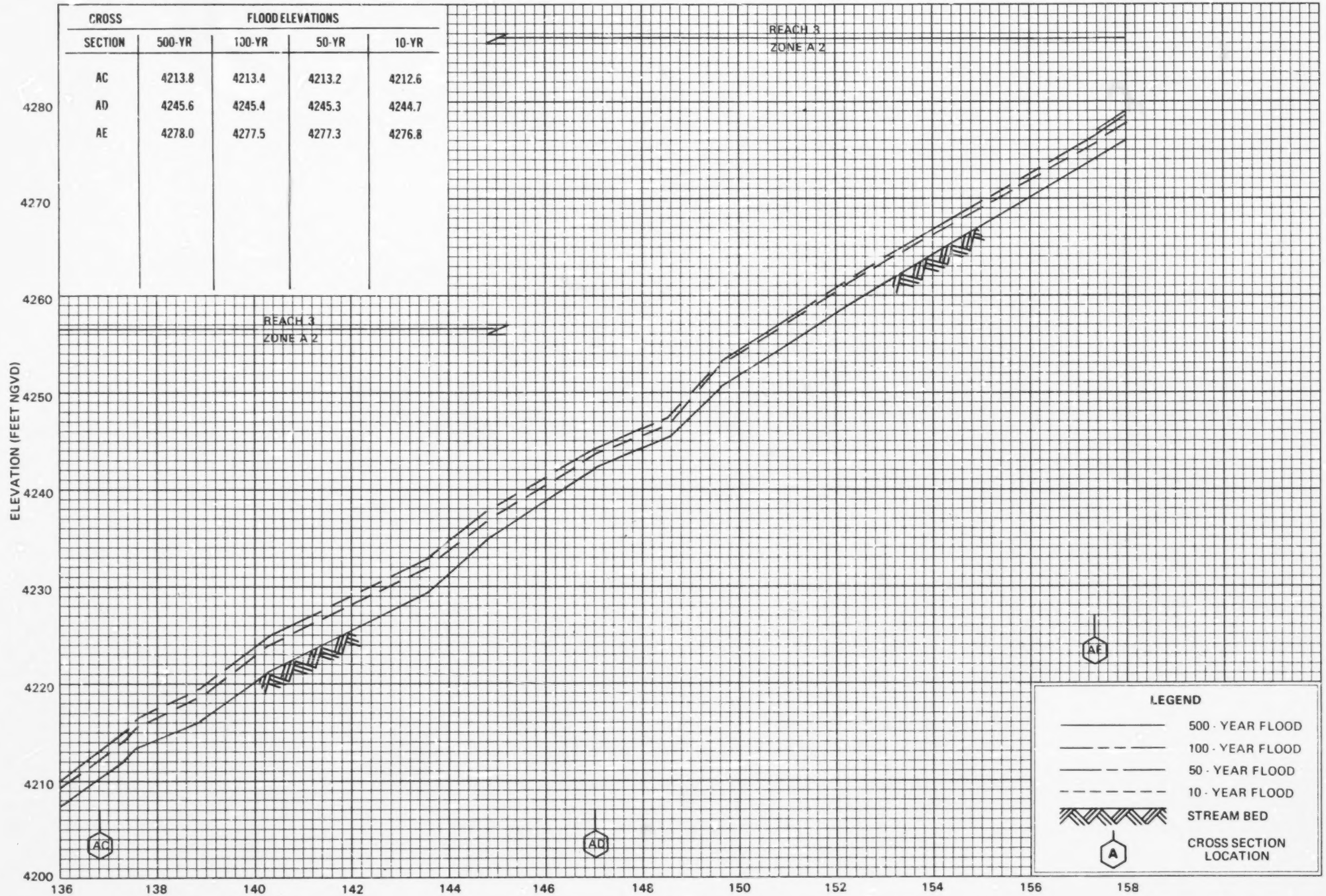
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

07P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AC	4213.8	4213.4	4213.2	4212.6
AD	4245.6	4245.4	4245.3	4244.7
AE	4278.0	4277.5	4277.3	4276.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

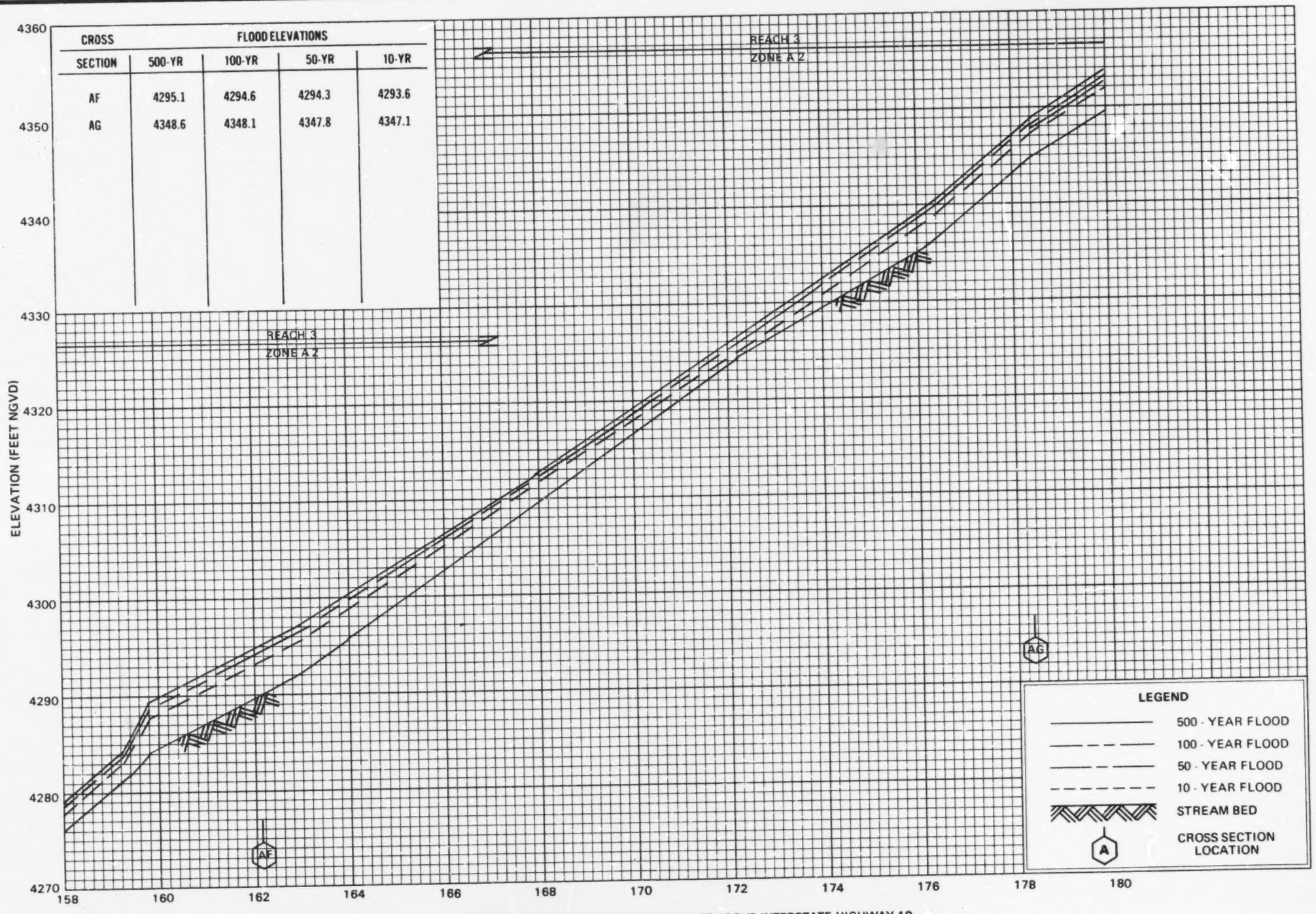
CITY OF EL PASO, TX
(EL PASO CO.)

08P

72

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AF	4295.1	4294.6	4294.3	4293.6
AG	4348.6	4348.1	4347.8	4347.1



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

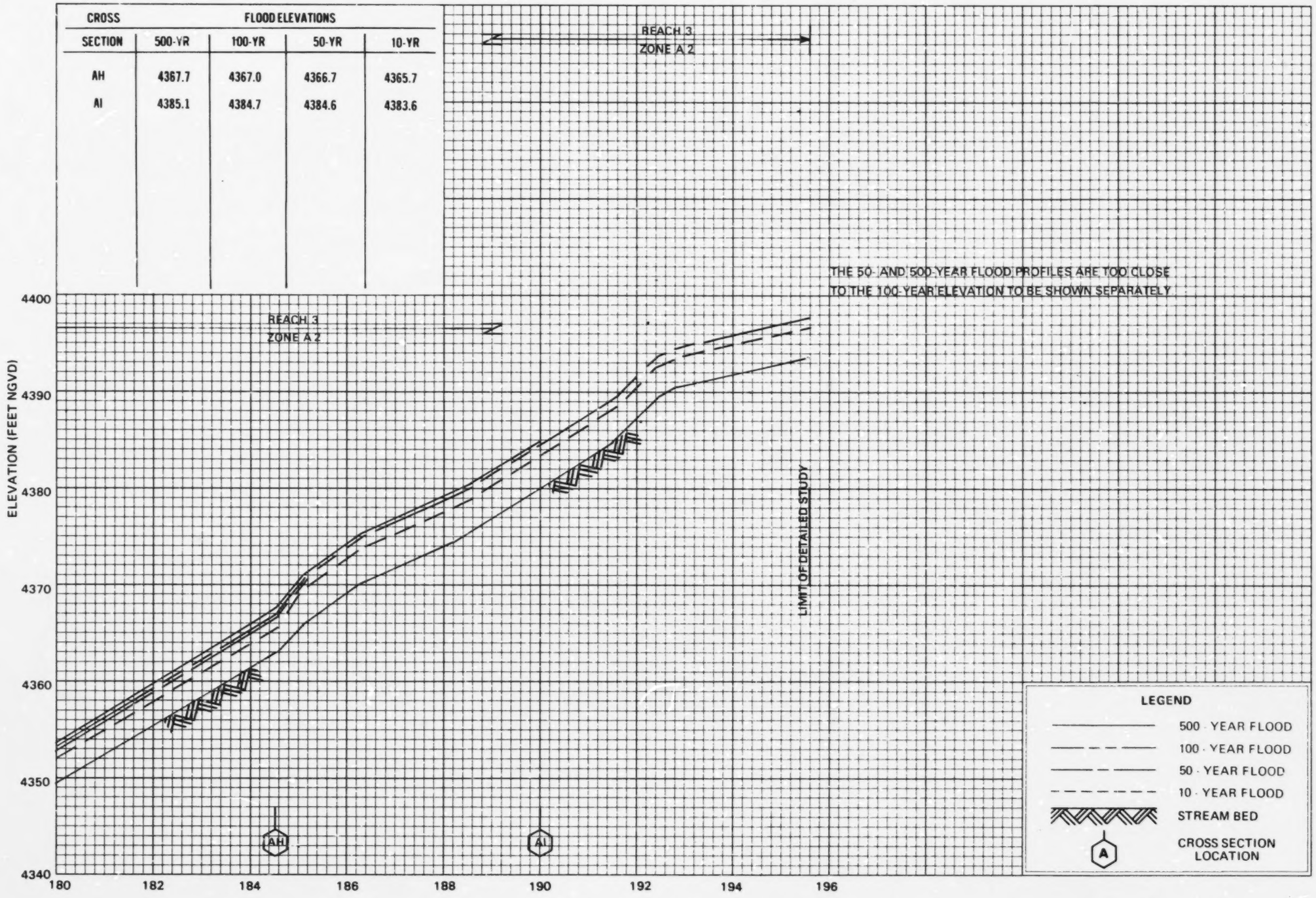
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

09P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AH	4367.7	4367.0	4366.7	4365.7
AI	4385.1	4384.7	4384.6	4383.6



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1

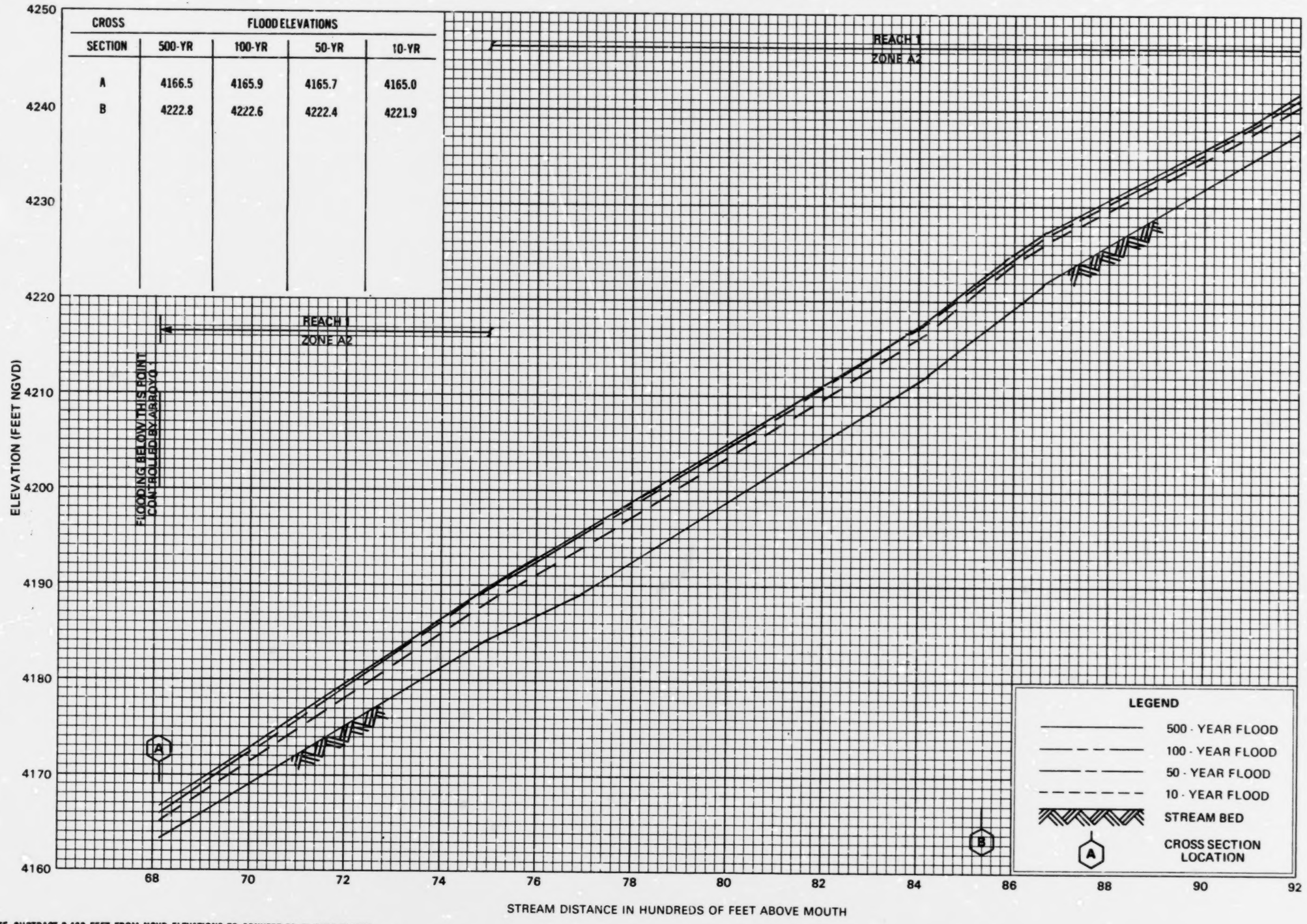
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

10P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
A	4166.5	4165.9	4165.7	4165.0
B	4222.8	4222.6	4222.4	4221.9



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1A

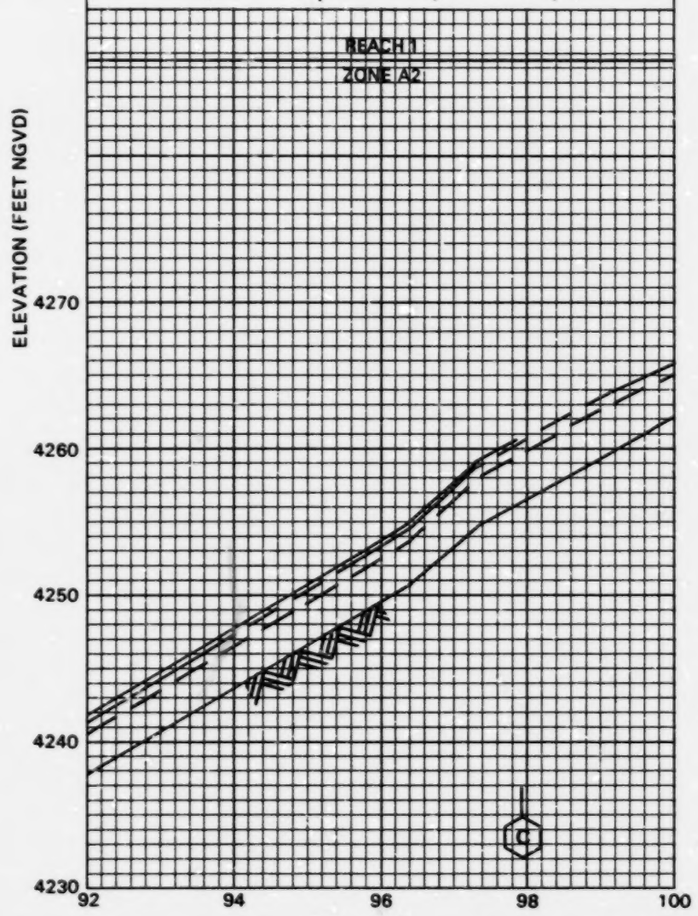
FEDERAL EMERGENCY MANAGEMENT AGENCY

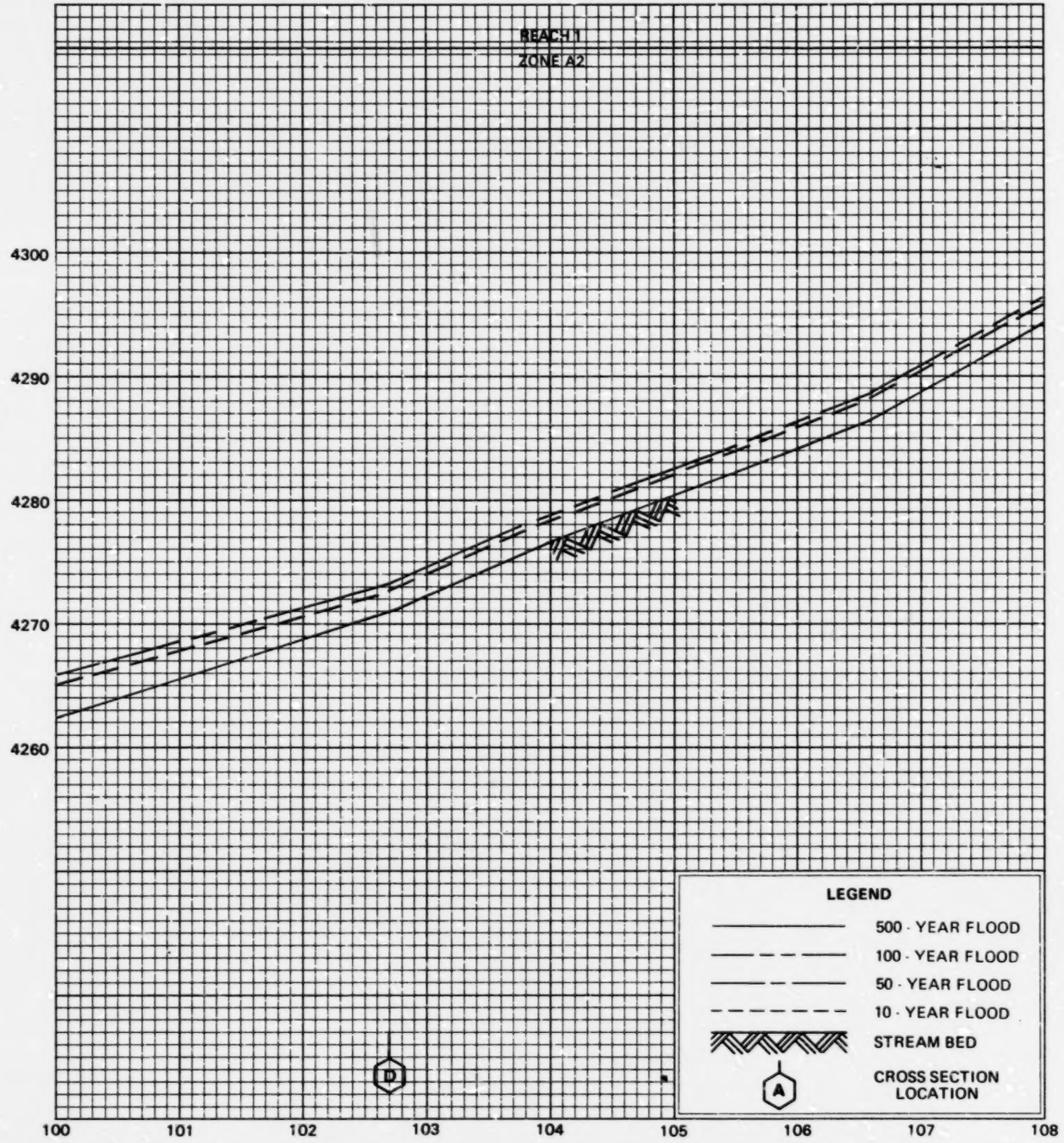
CITY OF EL PASO, TX
(EL PASO CO.)

11P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
C	4260.7	4260.5	4260.3	4259.6
D	4273.4	4273.1	4273.0	4272.6





STREAM DISTANCE IN HUNDREDS OF FEET ABOVE MOUTH

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1A

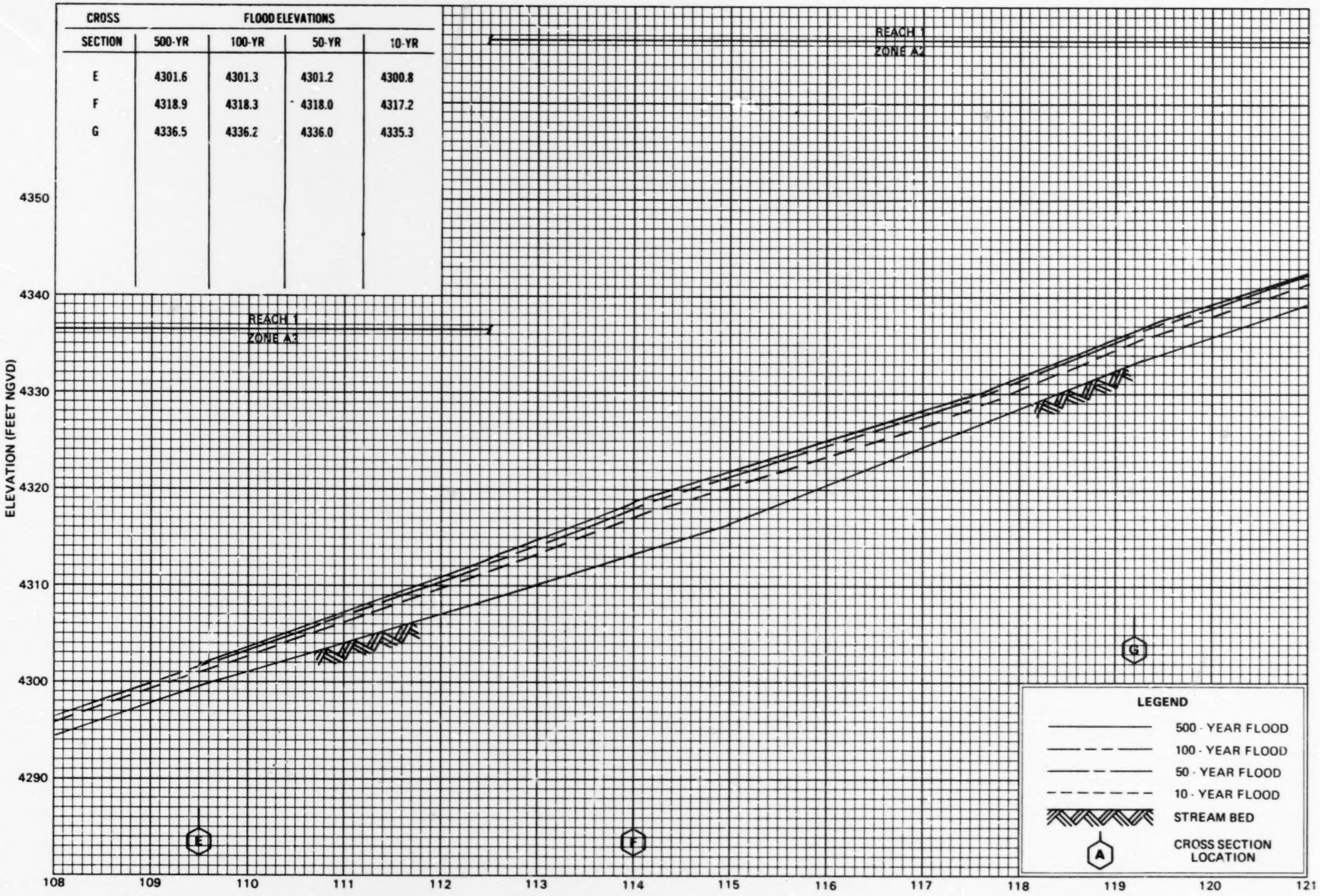
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

12P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
E	4301.6	4301.3	4301.2	4300.8
F	4318.9	4318.3	4318.0	4317.2
G	4336.5	4336.2	4336.0	4335.3



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1A

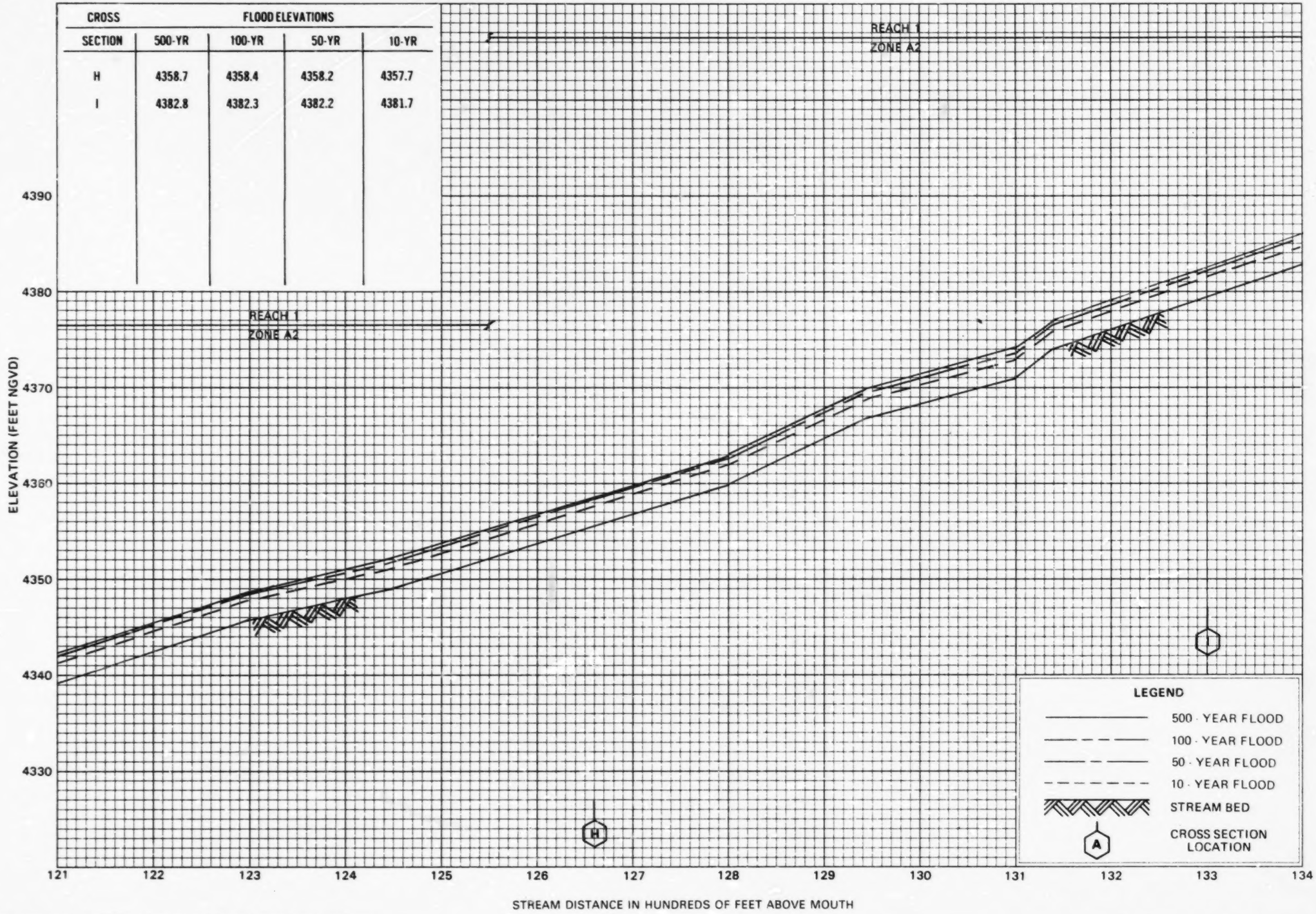
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

13P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
H	4358.7	4358.4	4358.2	4357.7
I	4382.8	4382.3	4382.2	4381.7



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1A

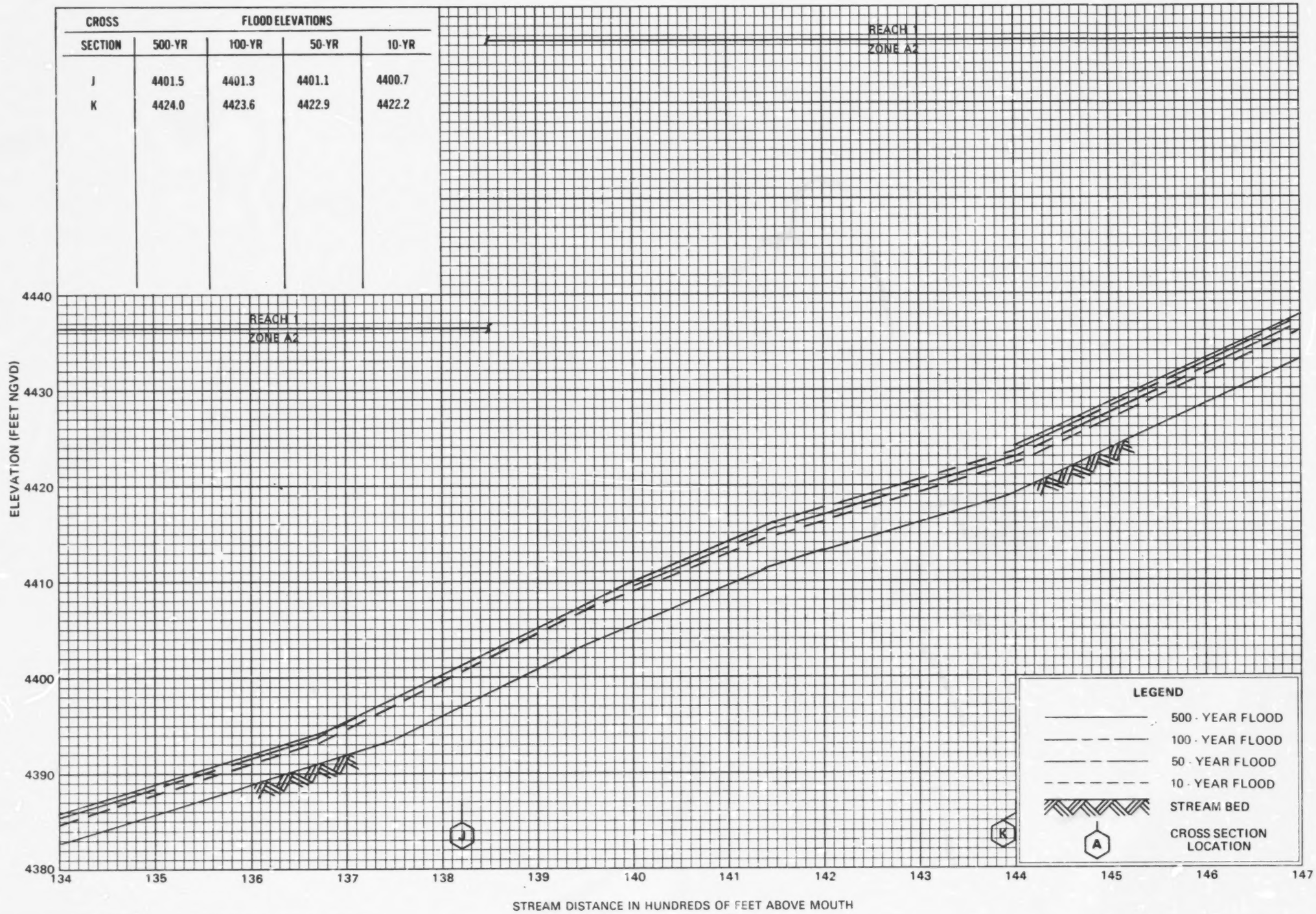
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

14P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
J	4401.5	4401.3	4401.1	4400.7
K	4424.0	4423.6	4422.9	4422.2



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1A

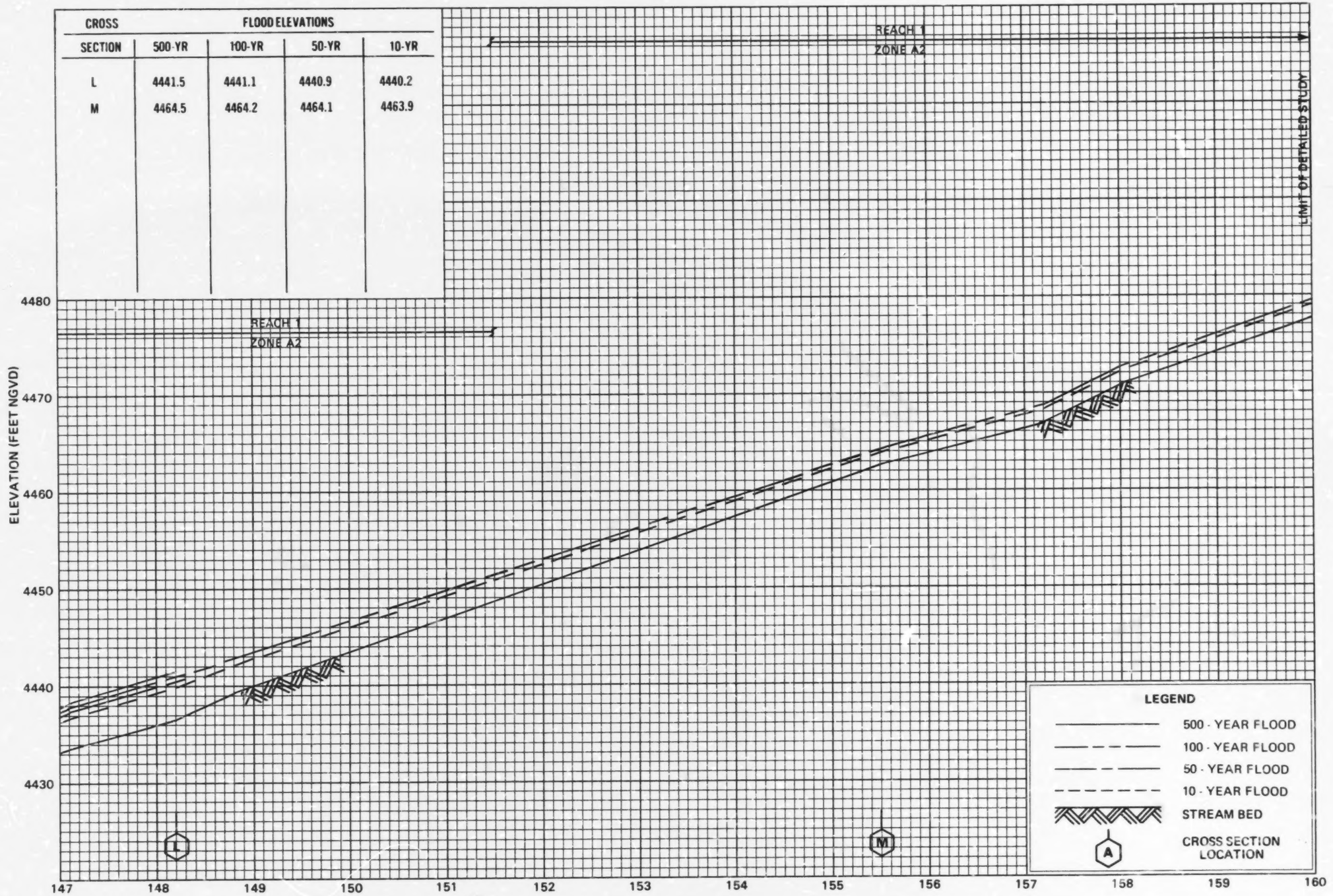
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

15P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
L	4441.5	4441.1	4440.9	4440.2
M	4464.5	4464.2	4464.1	4463.9



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 1A

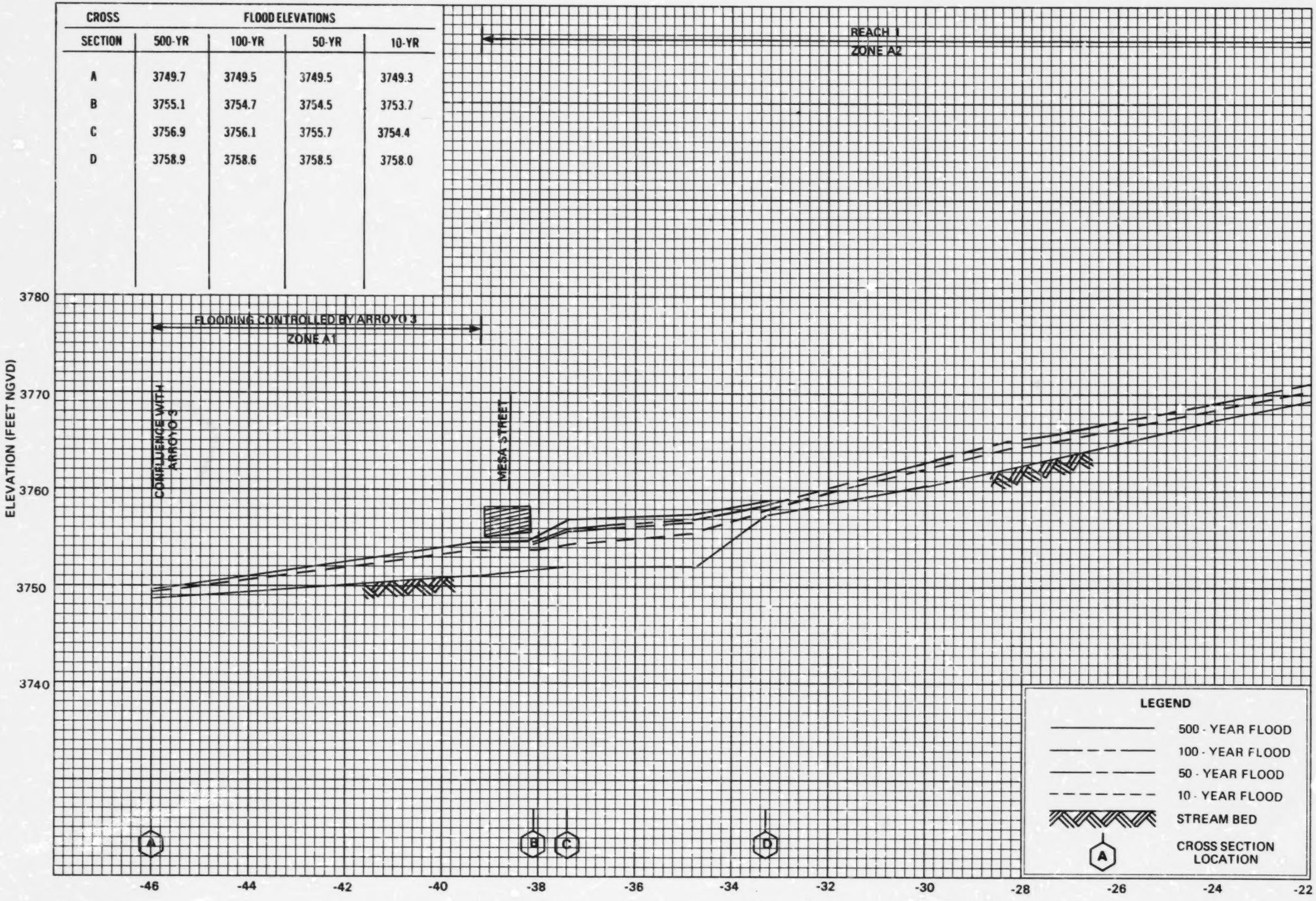
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

16P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
A	3749.7	3749.5	3749.5	3749.3
B	3755.1	3754.7	3754.5	3753.7
C	3756.9	3756.1	3755.7	3754.4
D	3758.9	3758.6	3758.5	3758.0



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2

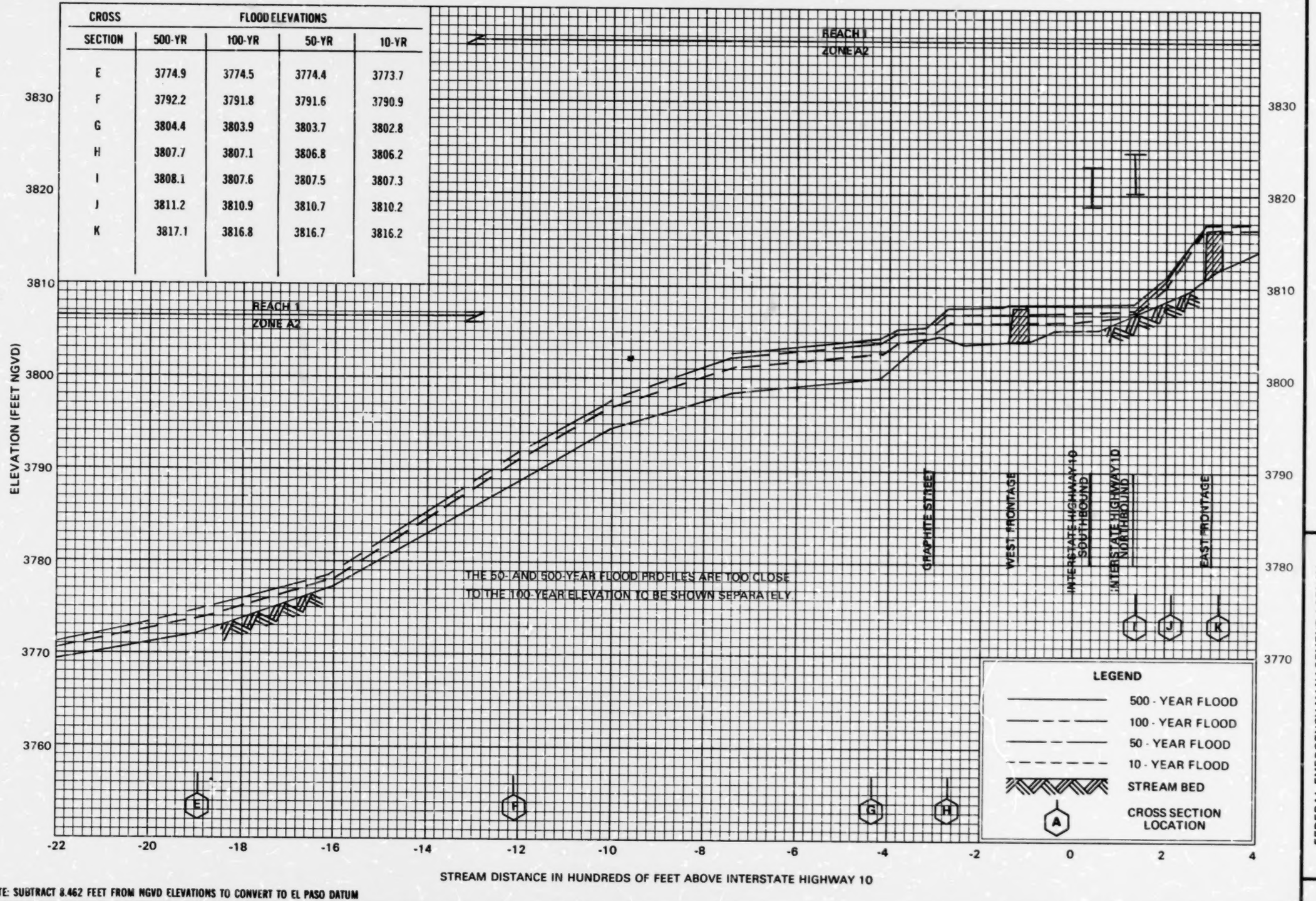
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

17P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
E	3774.9	3774.5	3774.4	3773.7
F	3792.2	3791.8	3791.6	3790.9
G	3804.4	3803.9	3803.7	3802.8
H	3807.7	3807.1	3806.8	3806.2
I	3808.1	3807.6	3807.5	3807.3
J	3811.2	3810.9	3810.7	3810.2
K	3817.1	3816.8	3816.7	3816.2



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2

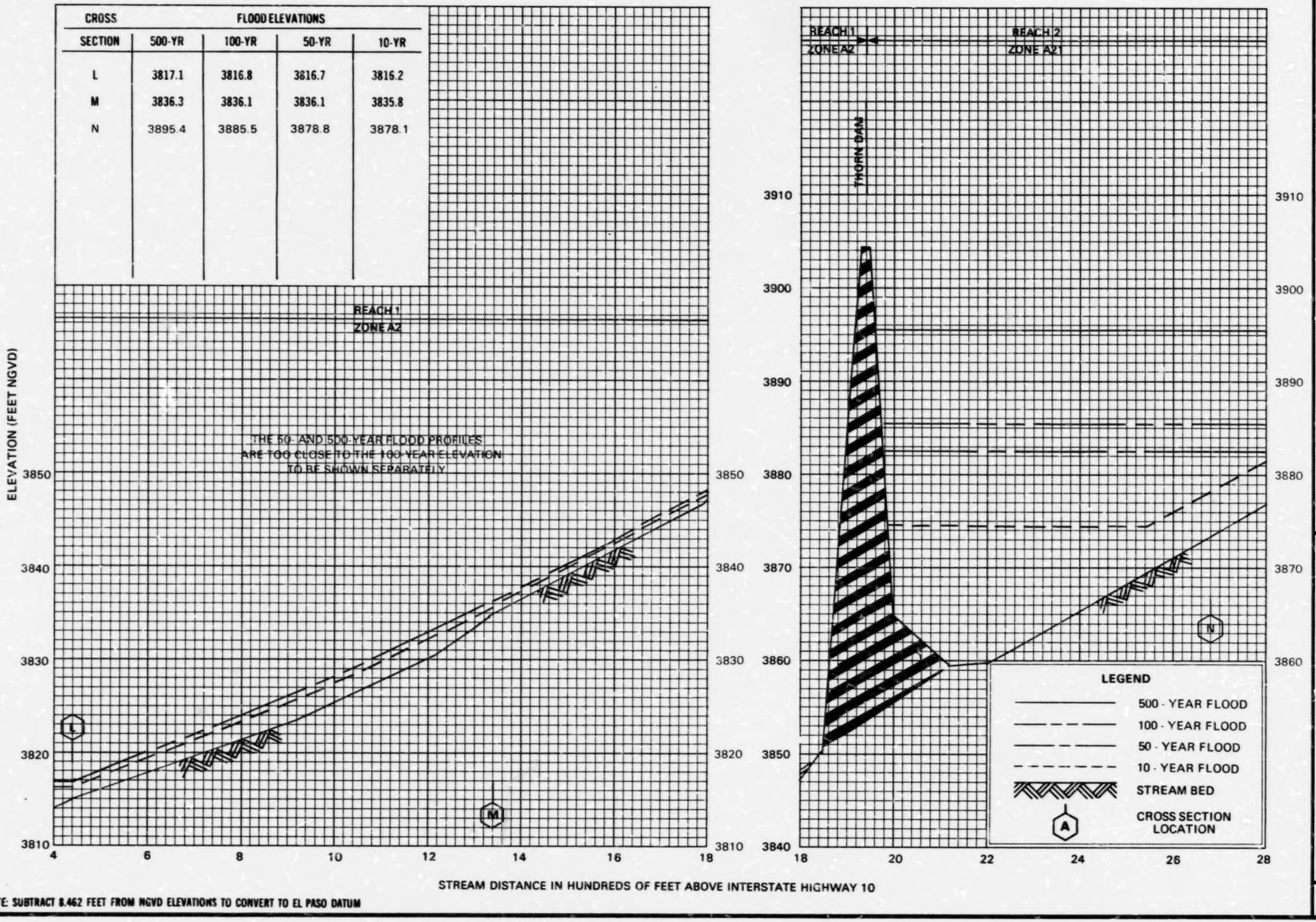
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

18P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
L	3817.1	3816.8	3816.7	3816.2
M	3836.3	3836.1	3836.1	3835.8
N	3895.4	3885.5	3878.8	3878.1



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2

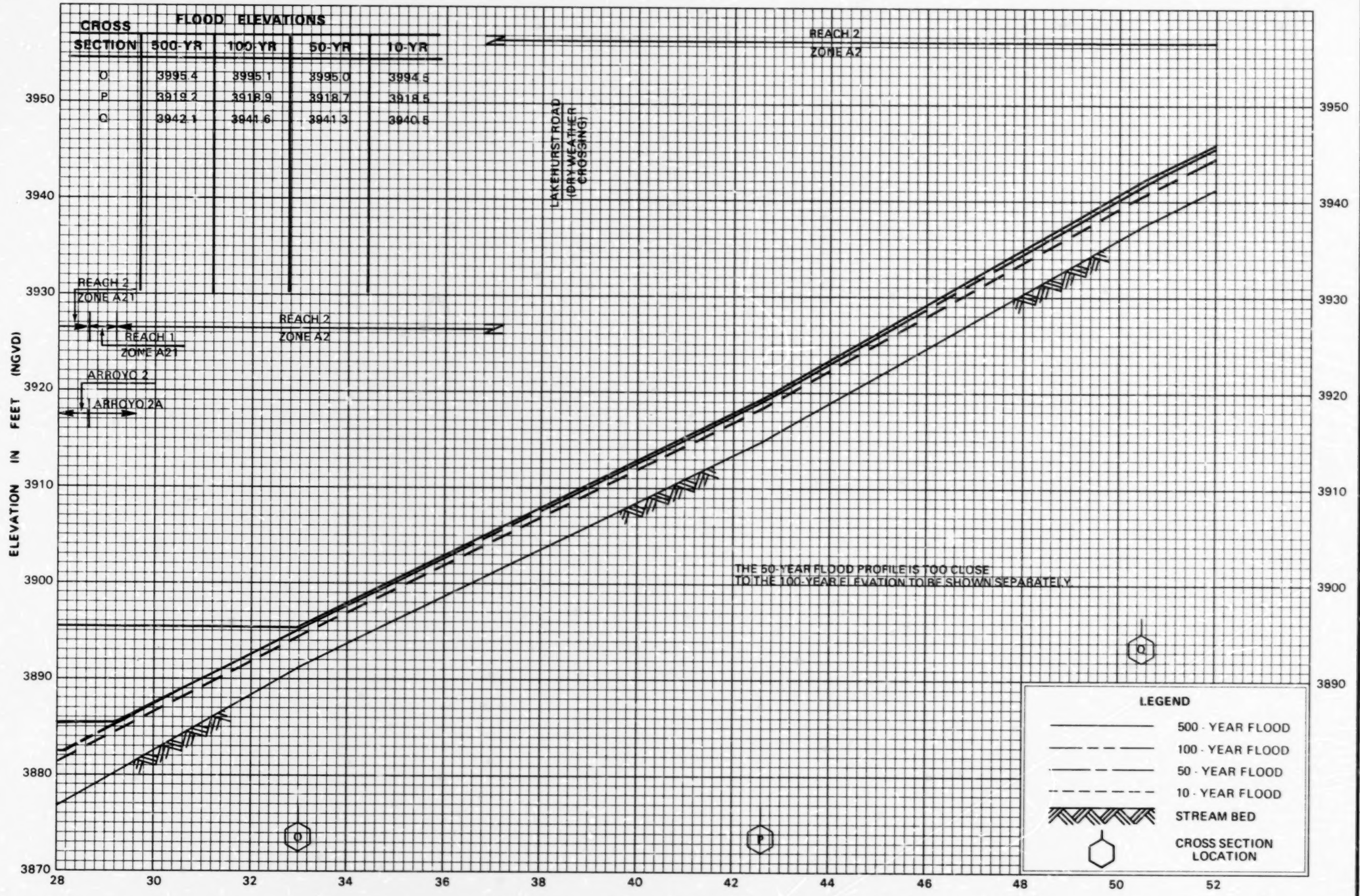
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

19P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS 500-YR	100-YR	50-YR	10-YR
O	3995.4	3995.1	3995.0	3994.5
P	3919.2	3918.9	3918.7	3918.5
Q	3942.1	3941.6	3941.3	3940.5



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

FLOOD PROFILES

ARROYO 2 – ARROYO 2A

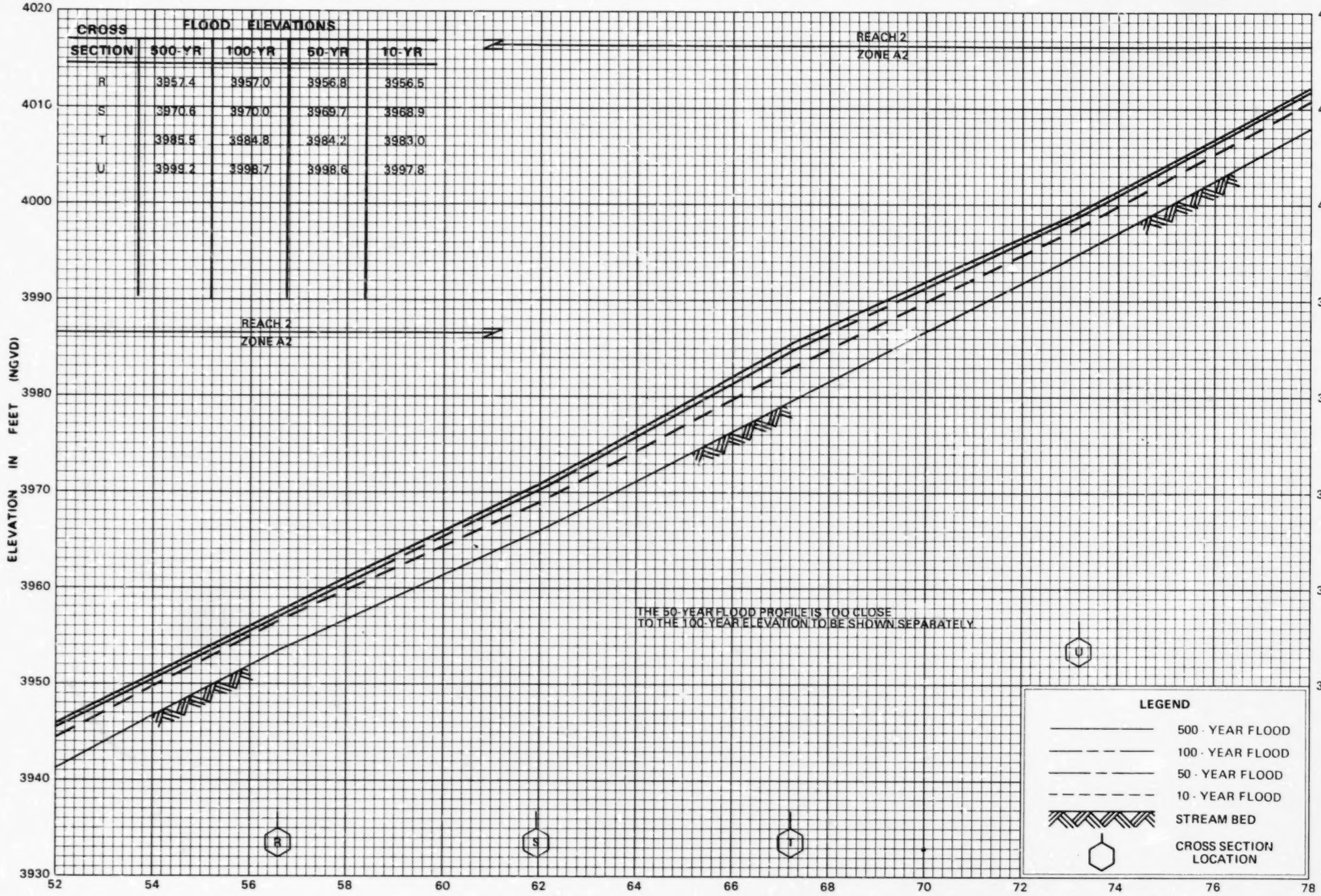
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

20P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS 500-YR	100-YR	50-YR	10-YR
R	3957.4	3957.0	3956.8	3956.5
S	3970.6	3970.0	3969.7	3968.9
T	3985.5	3984.8	3984.2	3983.0
U	3999.2	3998.7	3998.6	3997.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

FLOOD PROFILES

ARROYO 2 – ARROYO 2A

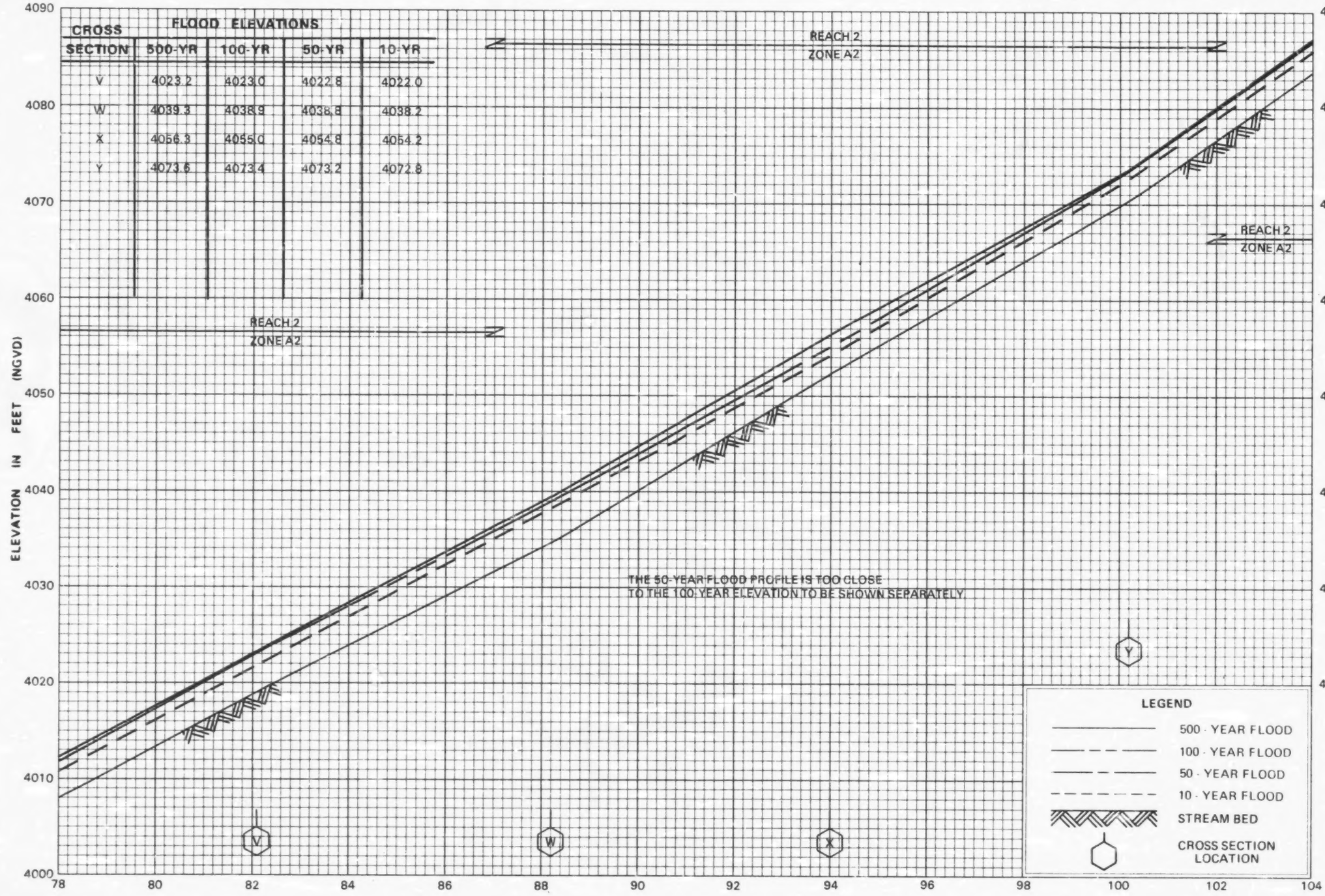
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

21P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS 500-YR	100-YR	50-YR	10-YR
V	4023.2	4023.0	4022.8	4022.0
W	4039.3	4038.9	4038.8	4038.2
X	4056.3	4055.0	4054.8	4054.2
Y	4073.6	4073.4	4073.2	4072.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

FLOOD PROFILES

ARROYO 2 – ARROYO 2A

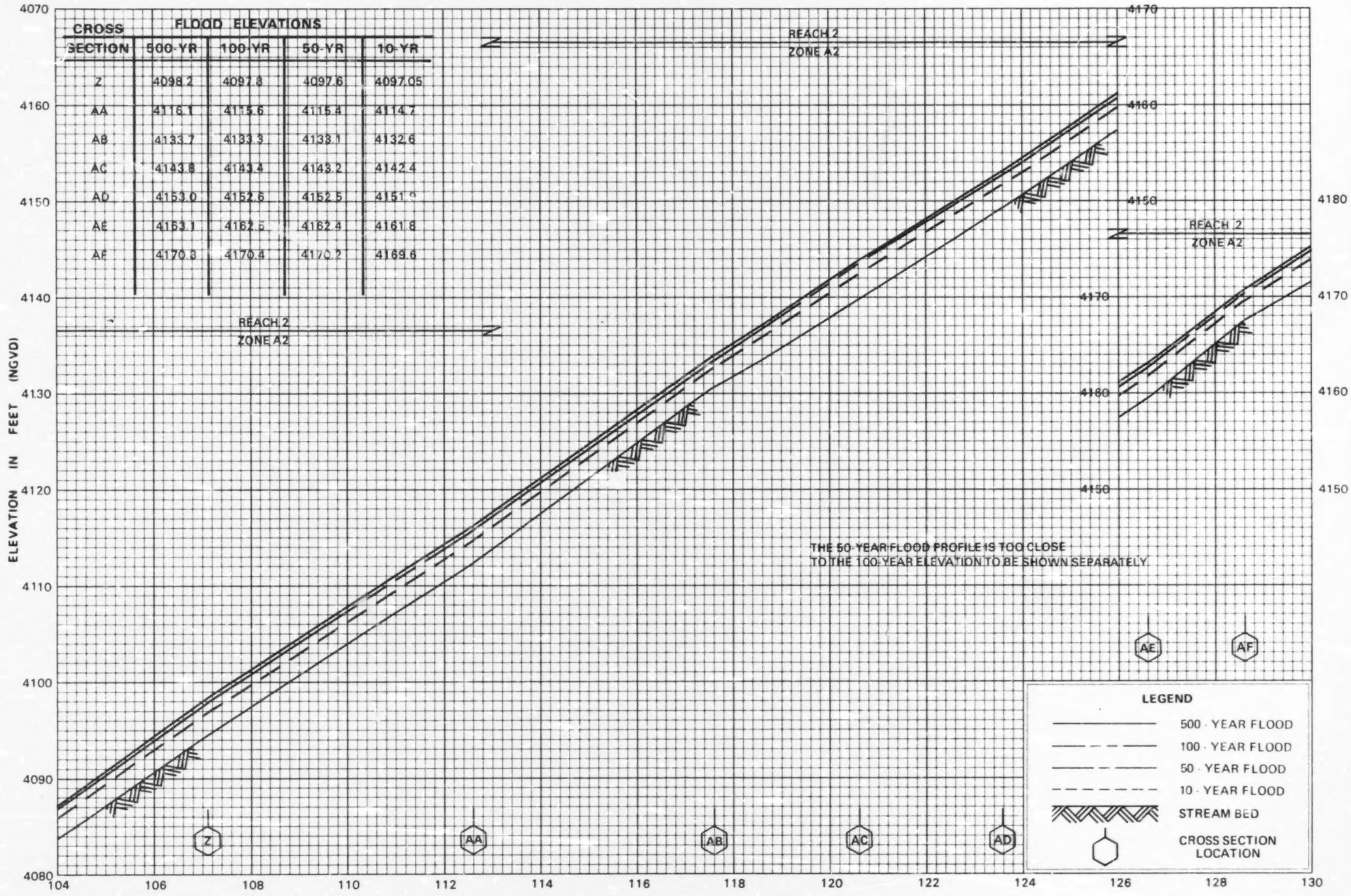
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

22P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS 500-YR	100-YR	50-YR	10-YR
Z	4098.2	4097.8	4097.6	4097.05
AA	4116.1	4115.6	4115.4	4114.7
AB	4133.7	4133.3	4133.1	4132.6
AC	4143.8	4143.4	4143.2	4142.4
AD	4153.0	4152.6	4152.5	4151.8
AE	4153.1	4162.5	4162.4	4161.8
AF	4170.3	4170.4	4170.2	4169.6



NOTE: SUBTRACT 8 462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2 – ARROYO 2A

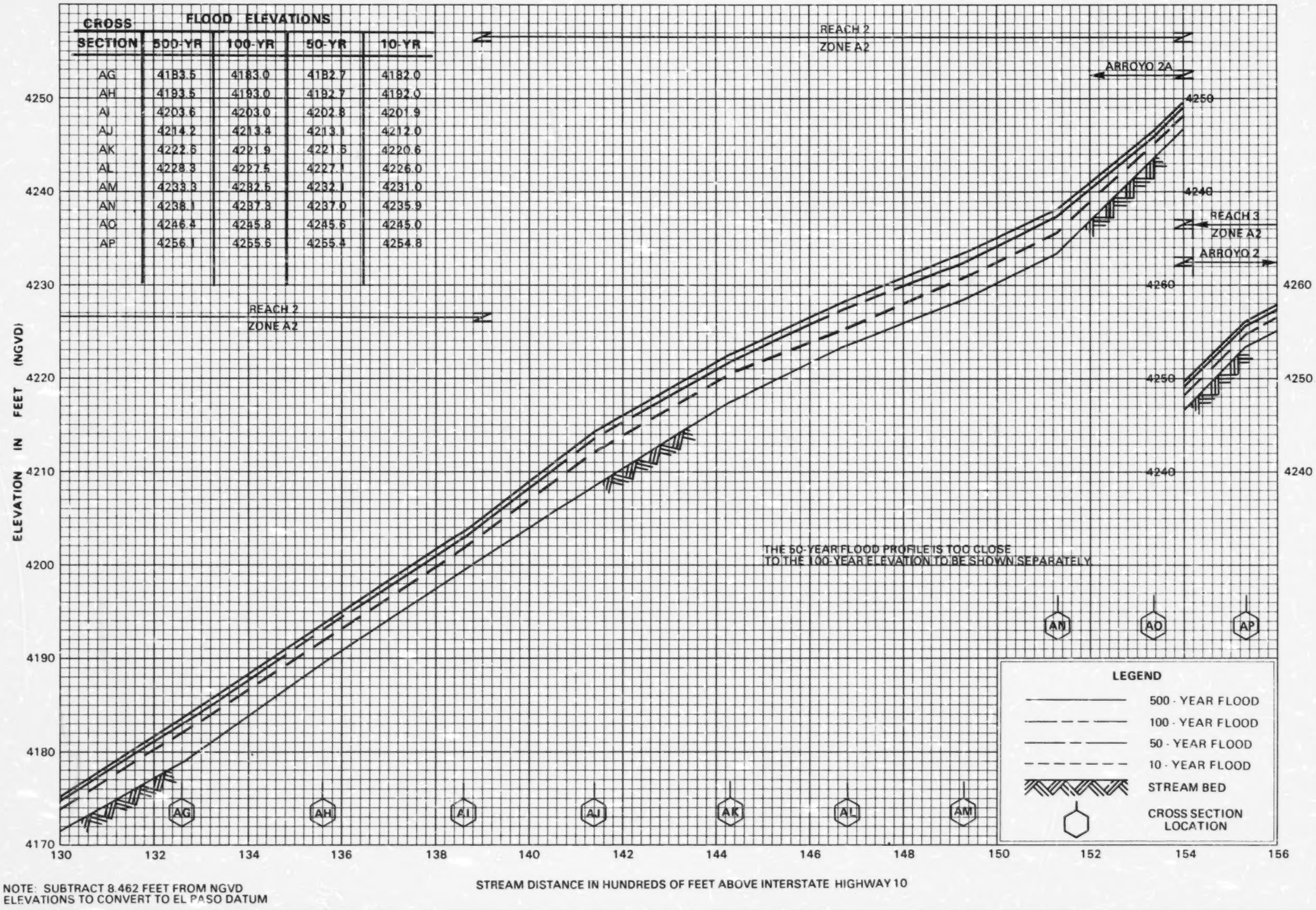
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

23P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS 500-YR	100-YR	50-YR	10-YR
AG	4183.5	4183.0	4182.7	4182.0
AH	4193.5	4193.0	4192.7	4192.0
AI	4203.6	4203.0	4202.8	4201.9
AJ	4214.2	4213.4	4213.1	4212.0
AK	4222.6	4221.9	4221.5	4220.6
AL	4228.3	4227.5	4227.1	4226.0
AM	4233.3	4232.5	4232.1	4231.0
AN	4238.1	4237.3	4237.0	4235.9
AO	4246.4	4245.8	4245.6	4245.0
AP	4256.1	4255.5	4255.4	4254.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2 – ARROYO 2A

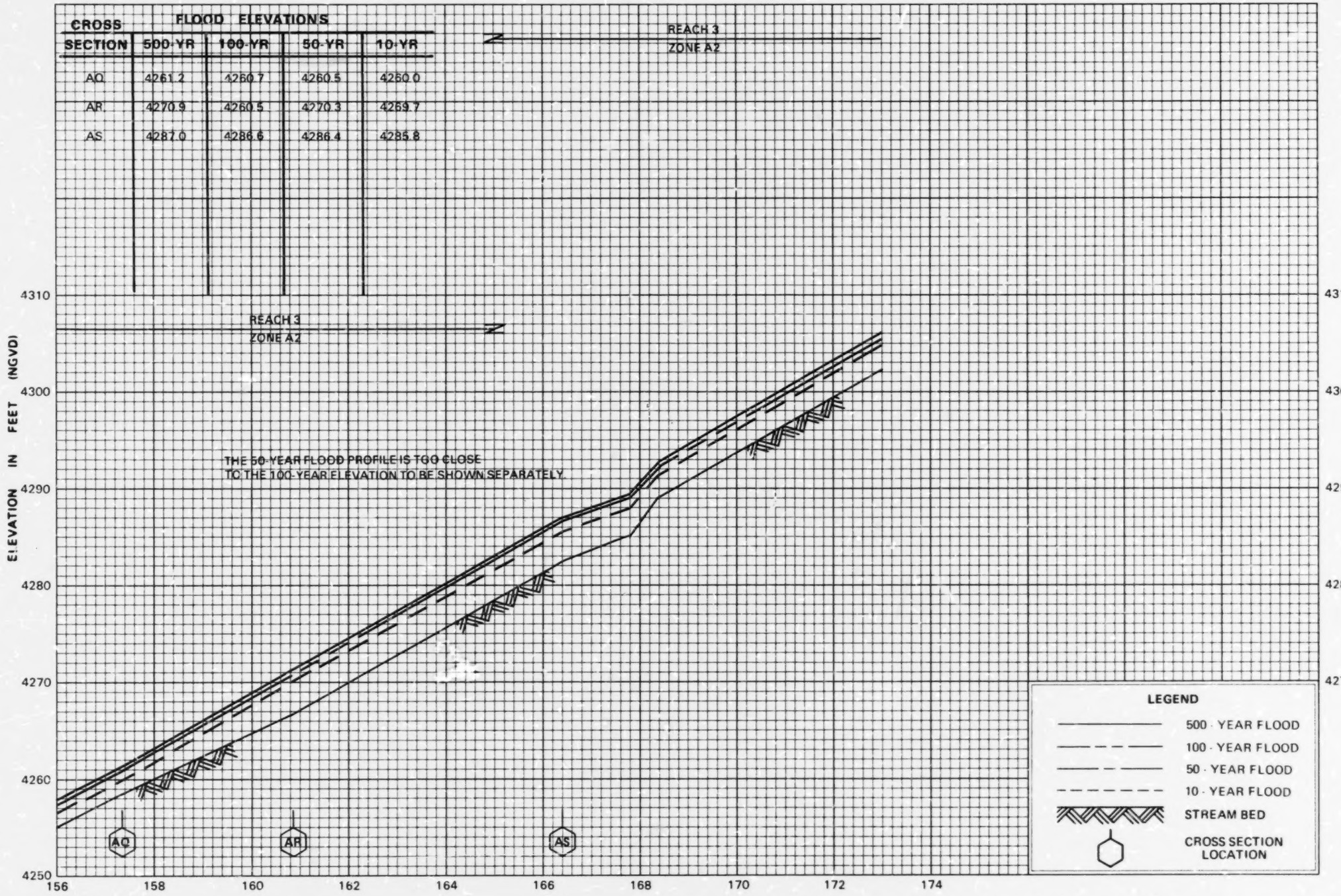
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

24P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS 500-YR	100-YR	50-YR	10-YR
AQ	4261.2	4260.7	4260.5	4260.0
AR	4270.9	4260.5	4270.3	4269.7
AS	4287.0	4286.6	4286.4	4285.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

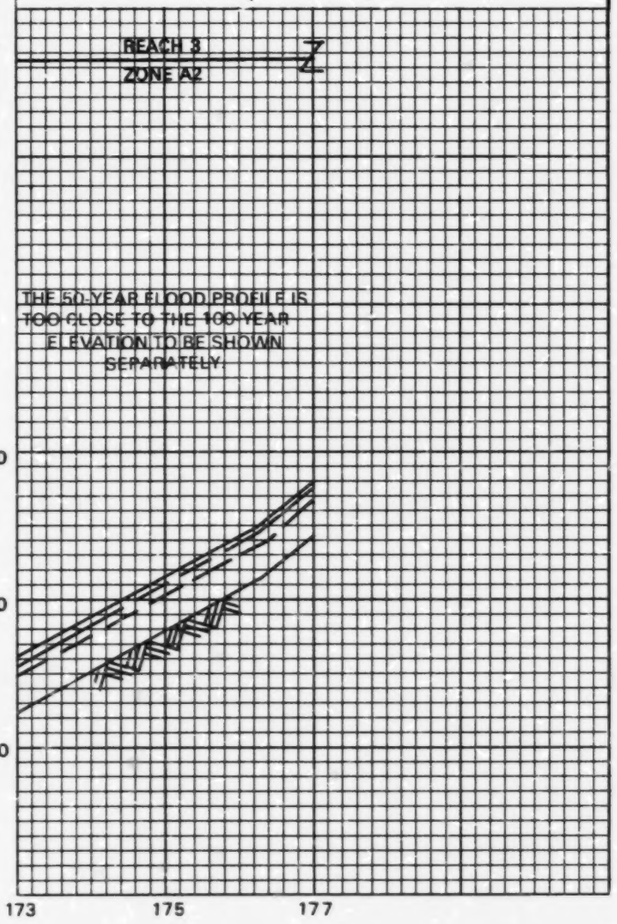
CITY OF EL PASO, TX
(EL PASO CO.)

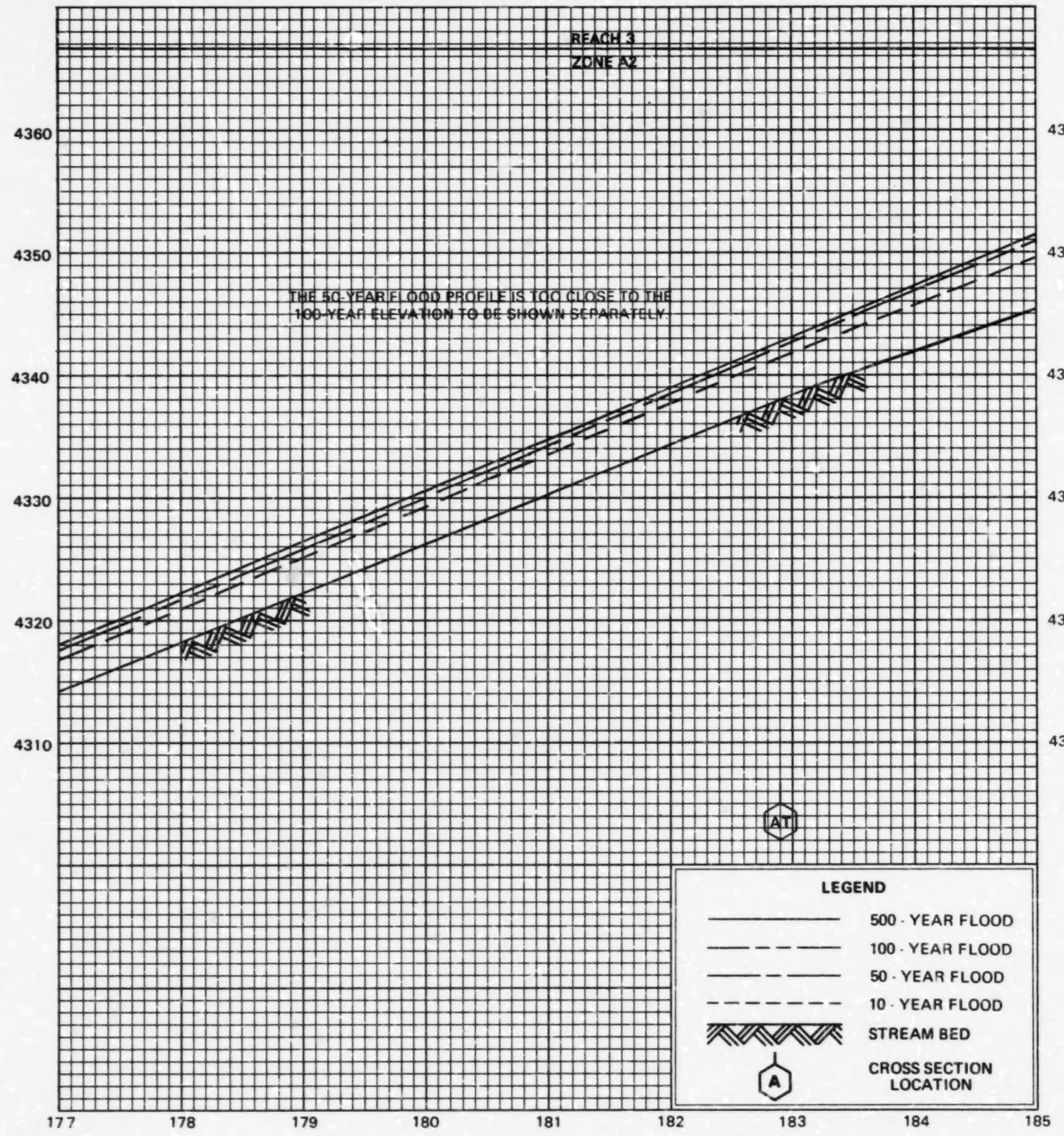
25P

89

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AT	4342.7	4342.3	4342.0	4341.3





STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2

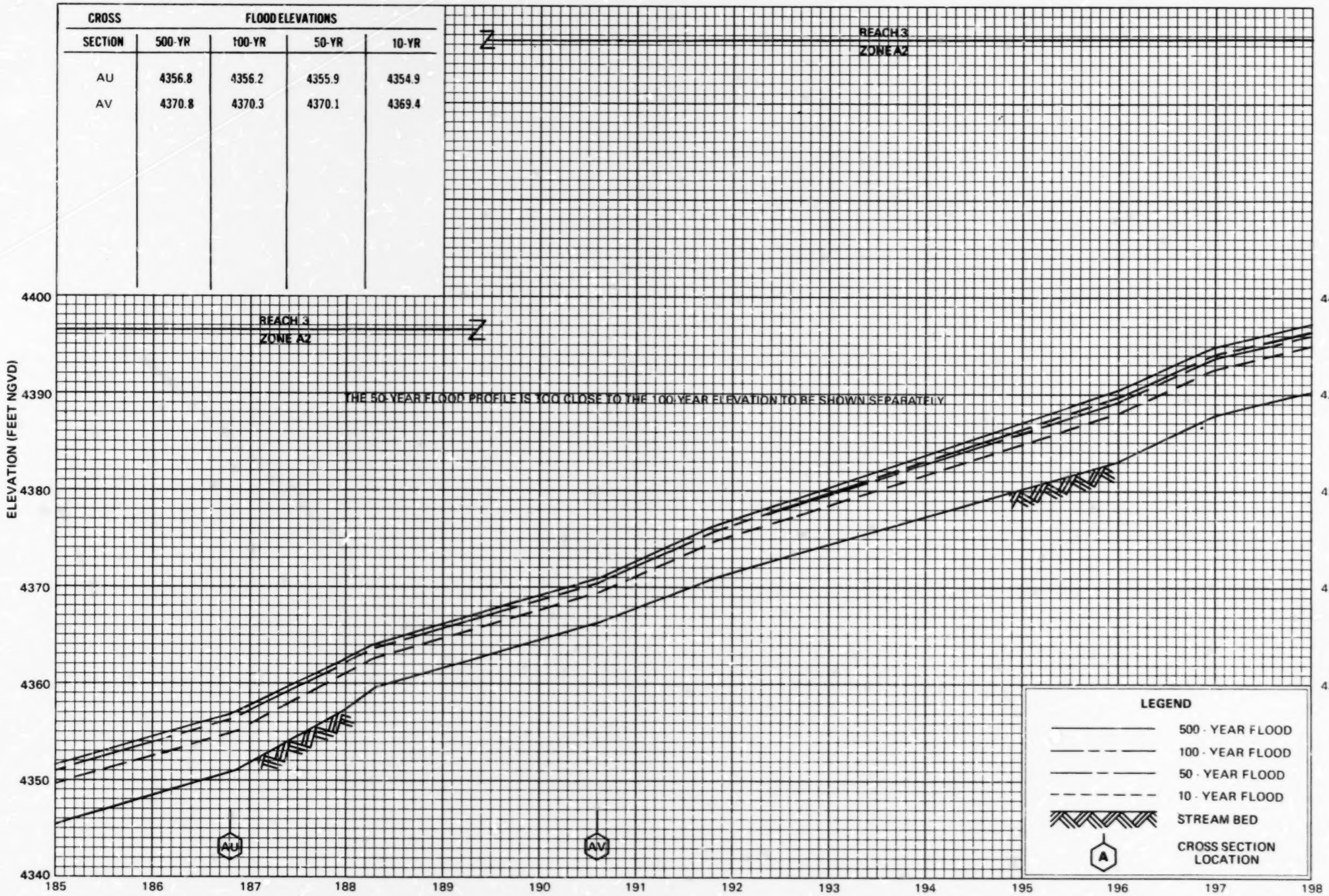
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

26P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AU	4356.8	4356.2	4355.9	4354.9
AV	4370.8	4370.3	4370.1	4369.4



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2

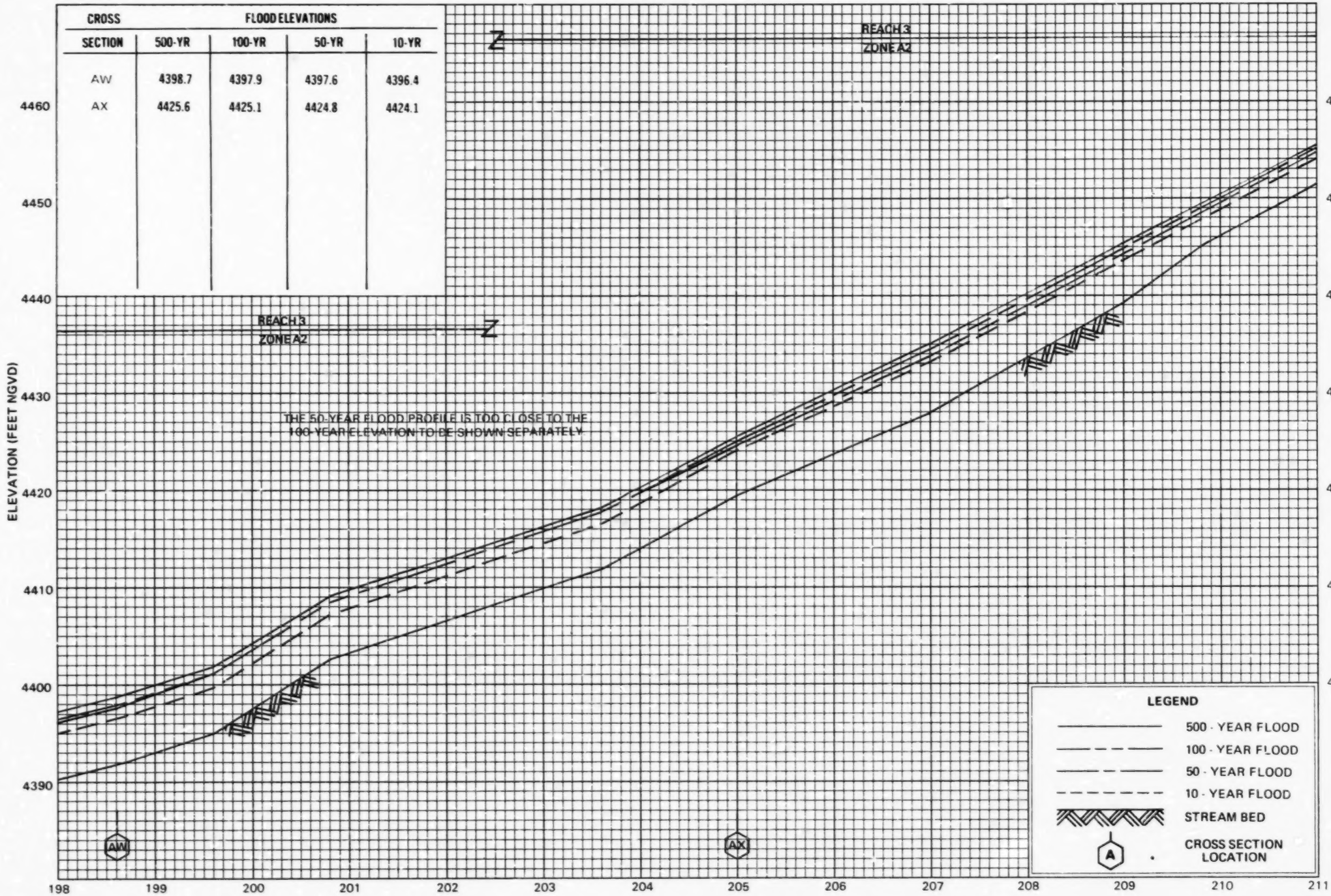
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

27P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AW	4398.7	4397.9	4397.6	4396.4
AX	4425.6	4425.1	4424.8	4424.1



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2

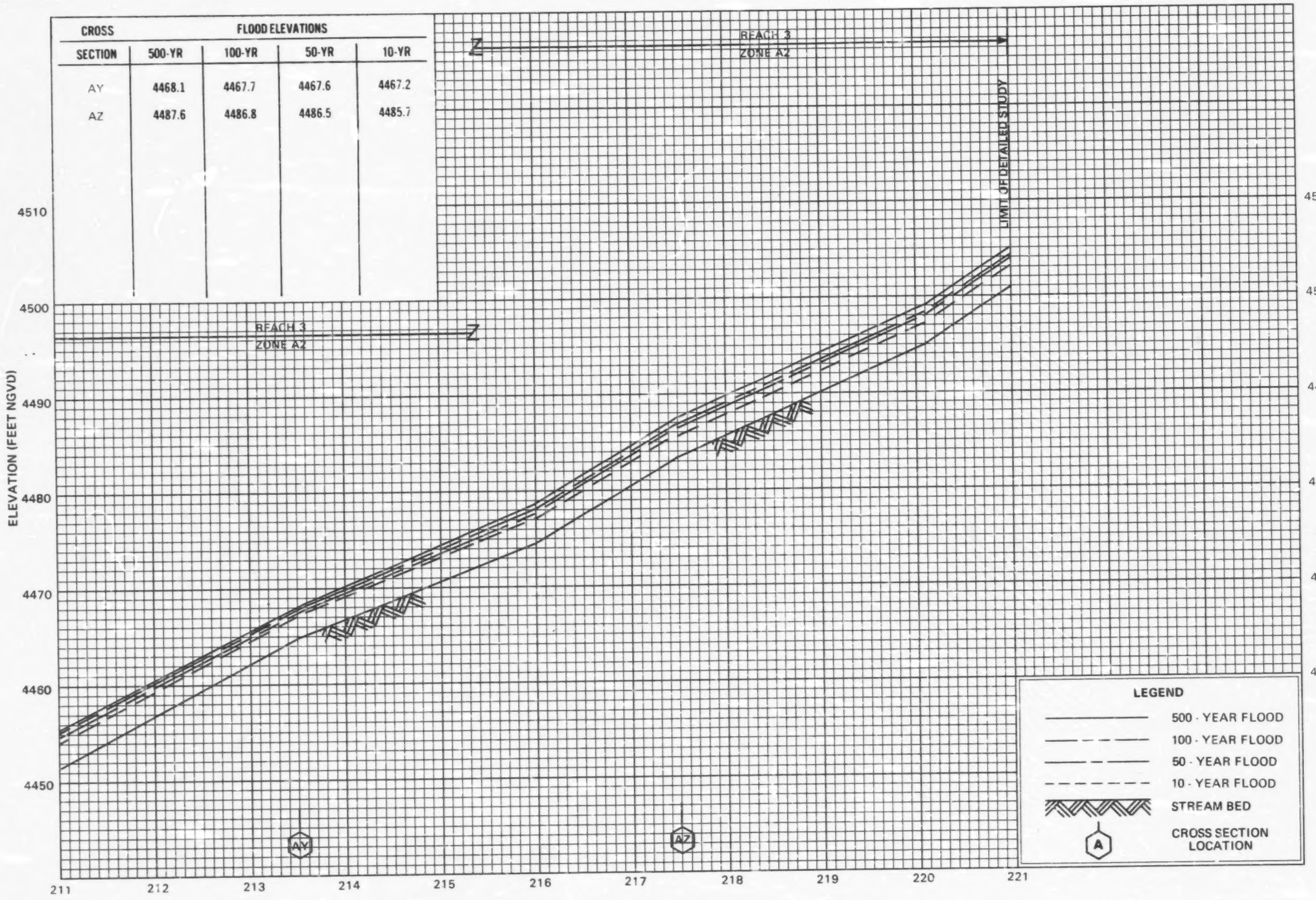
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

28P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AY	4468.1	4467.7	4467.6	4467.2
AZ	4487.6	4486.8	4486.5	4485.7



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 2

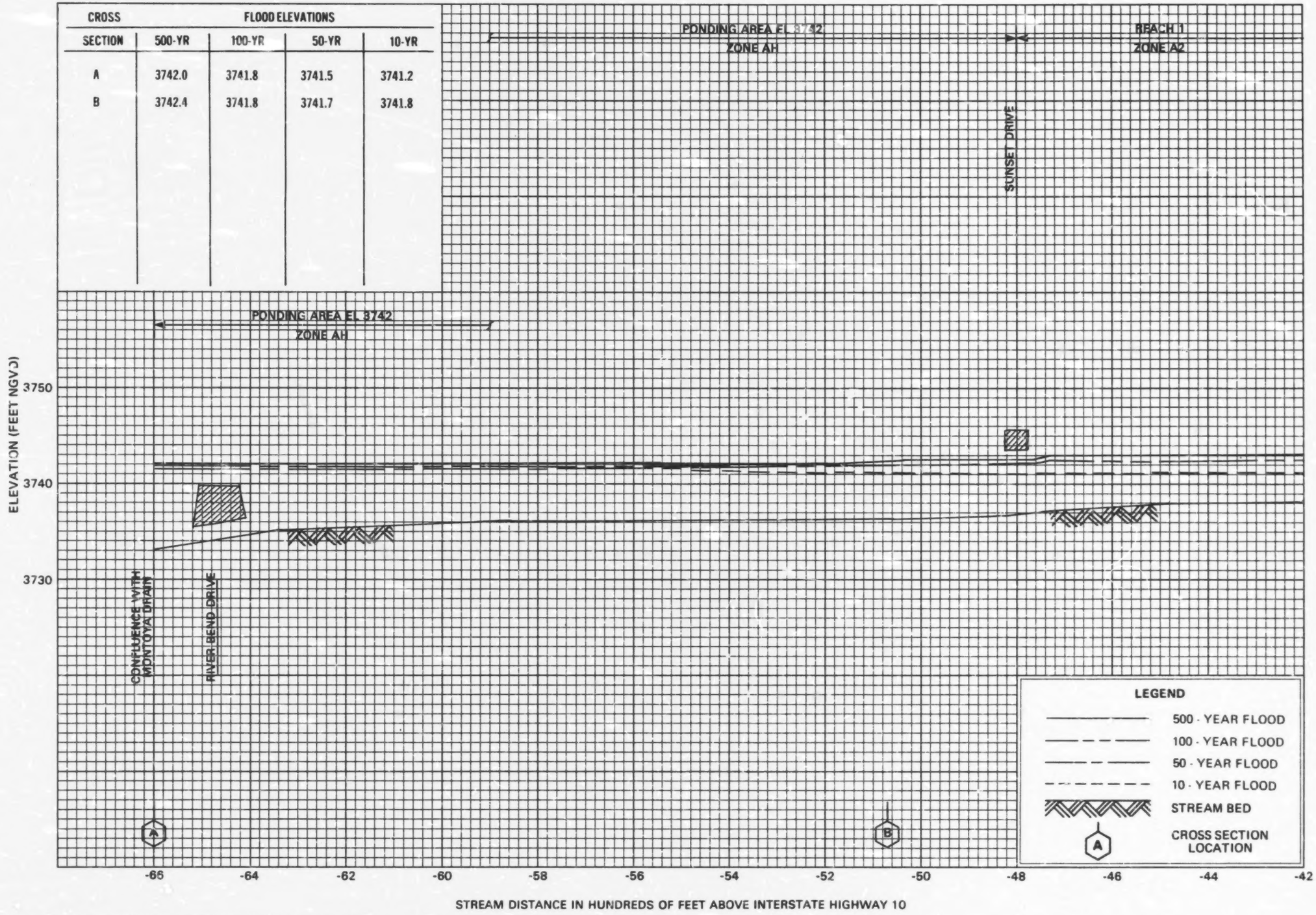
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

29P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
A	3742.0	3741.8	3741.5	3741.2
B	3742.4	3741.8	3741.7	3741.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

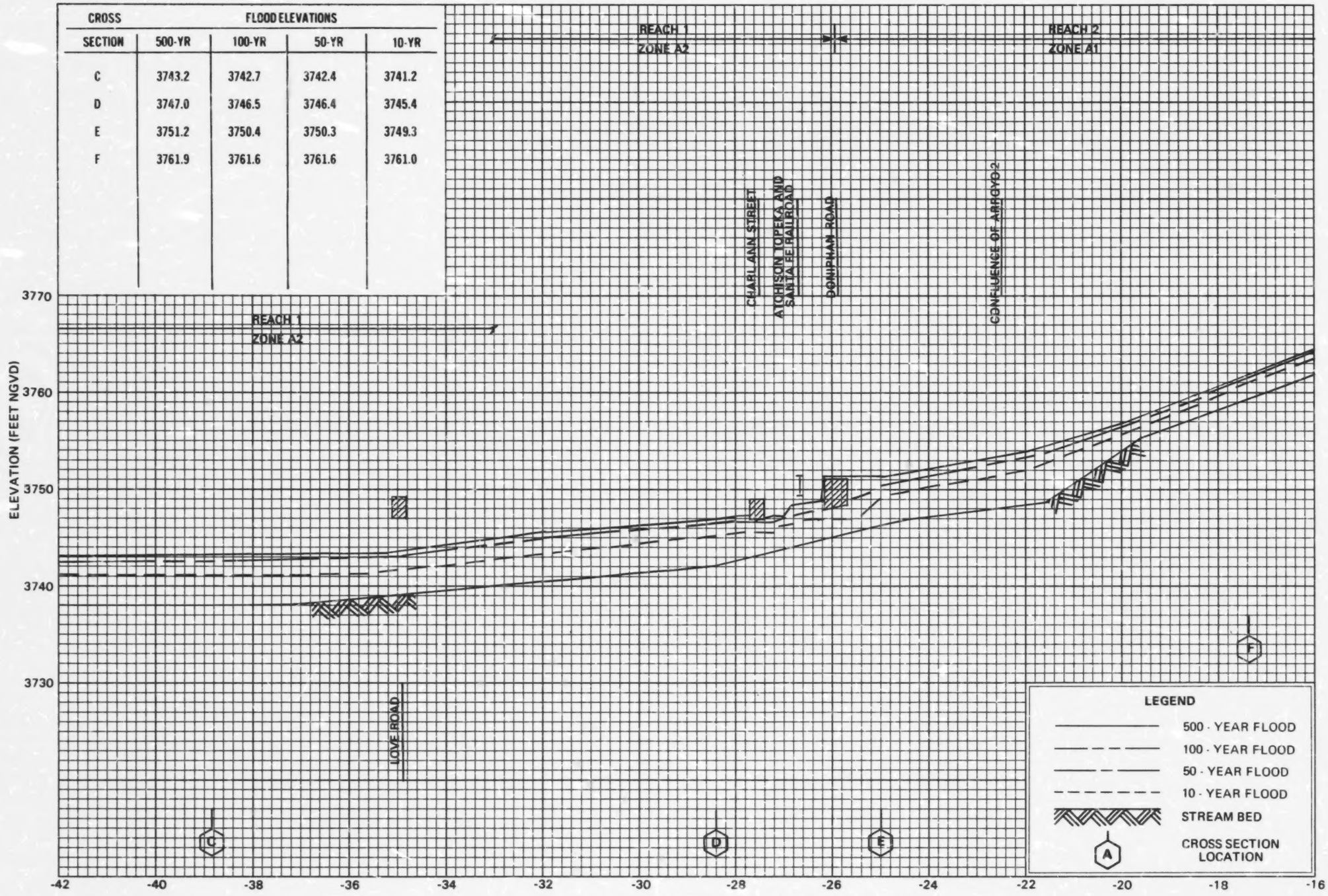
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

30P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
C	3743.2	3742.7	3742.4	3741.2
D	3747.0	3746.5	3746.4	3745.4
E	3751.2	3750.4	3750.3	3749.3
F	3761.9	3761.6	3761.6	3761.0



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

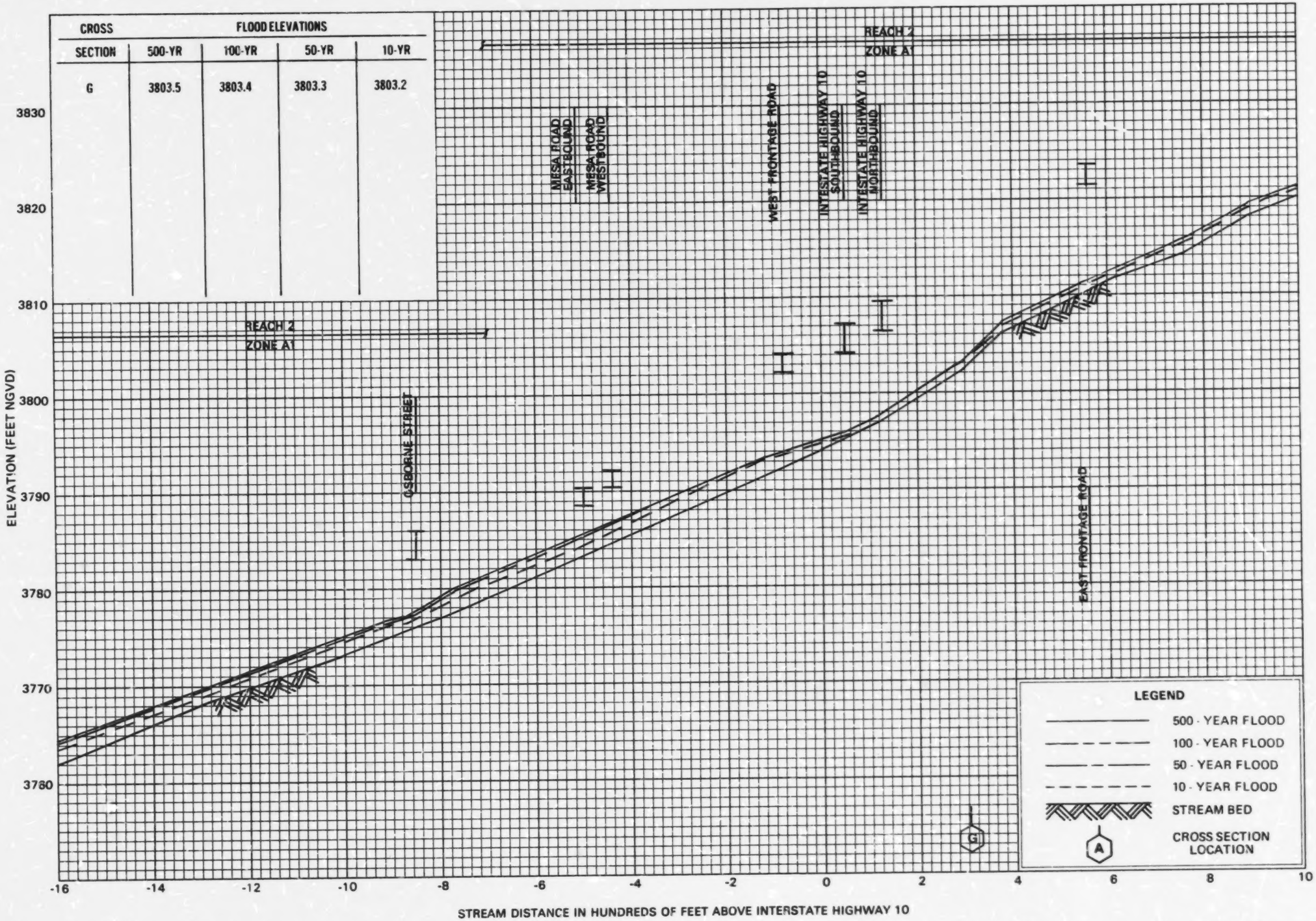
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

31P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
G	3803.5	3803.4	3803.3	3803.2



NOTE: SUBTRACT 3.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

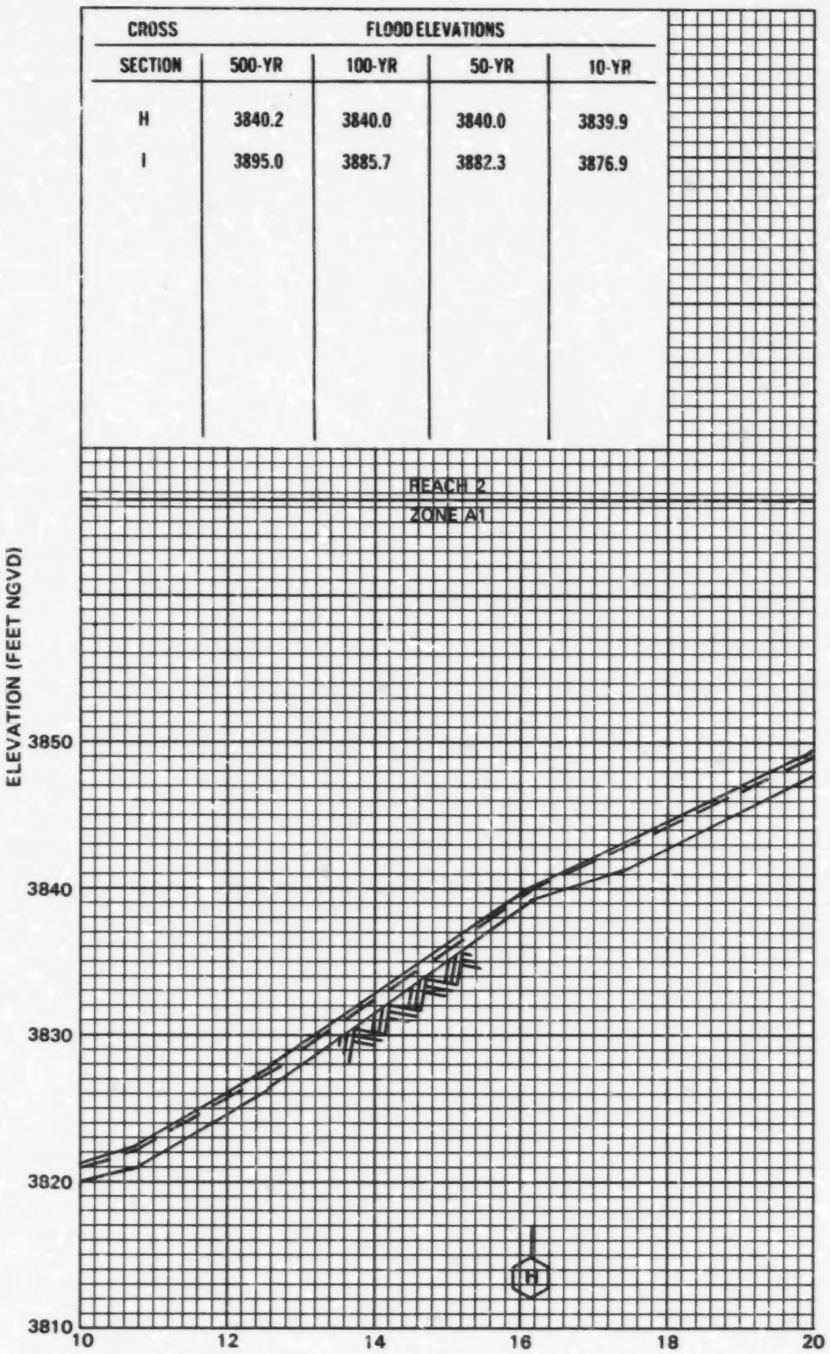
FEDERAL EMERGENCY MANAGEMENT AGENCY

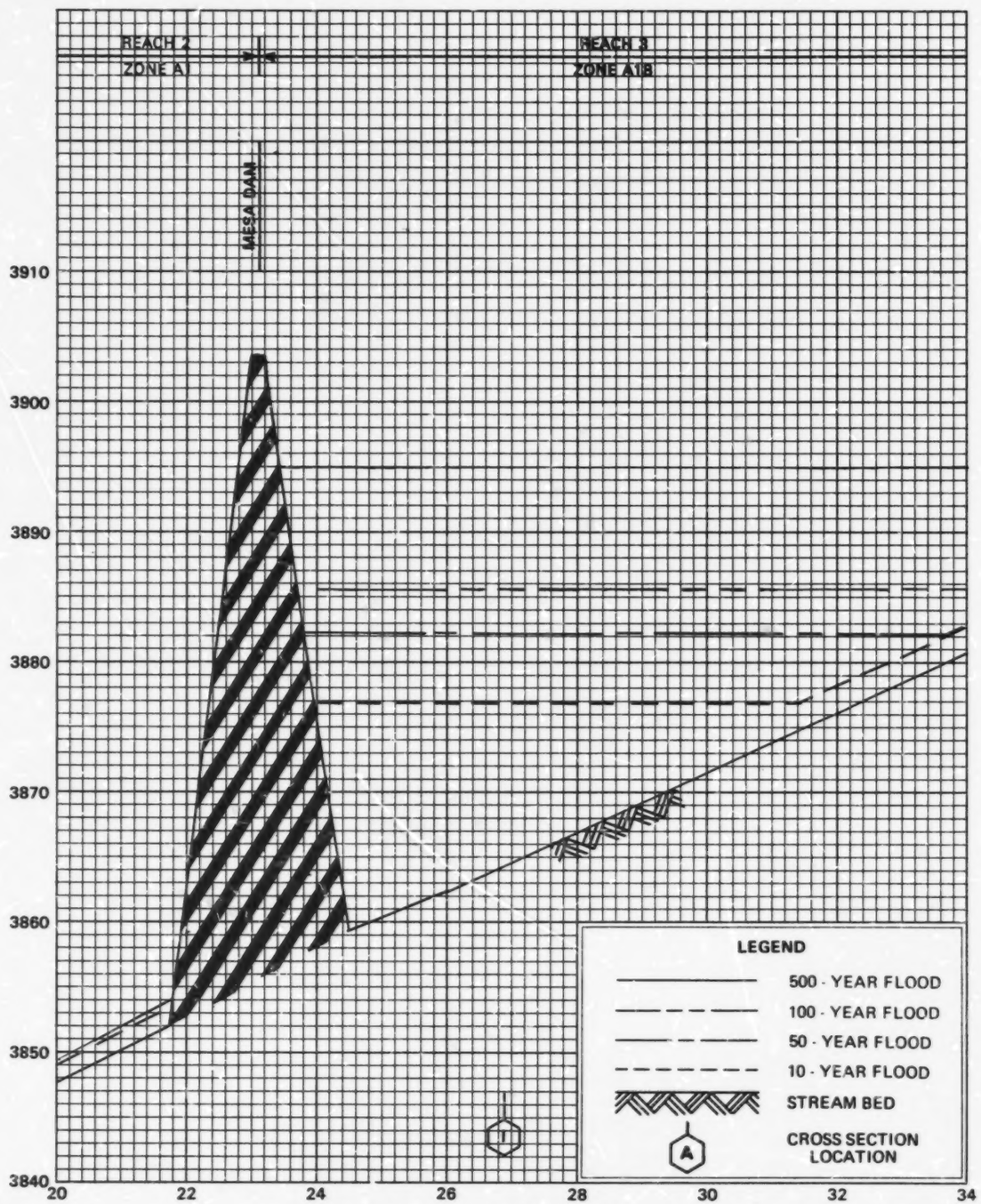
CITY OF EL PASO, TX
(EL PASO CO.)

32P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
H	3840.2	3840.0	3840.0	3839.9
I	3895.0	3885.7	3882.3	3876.9





STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

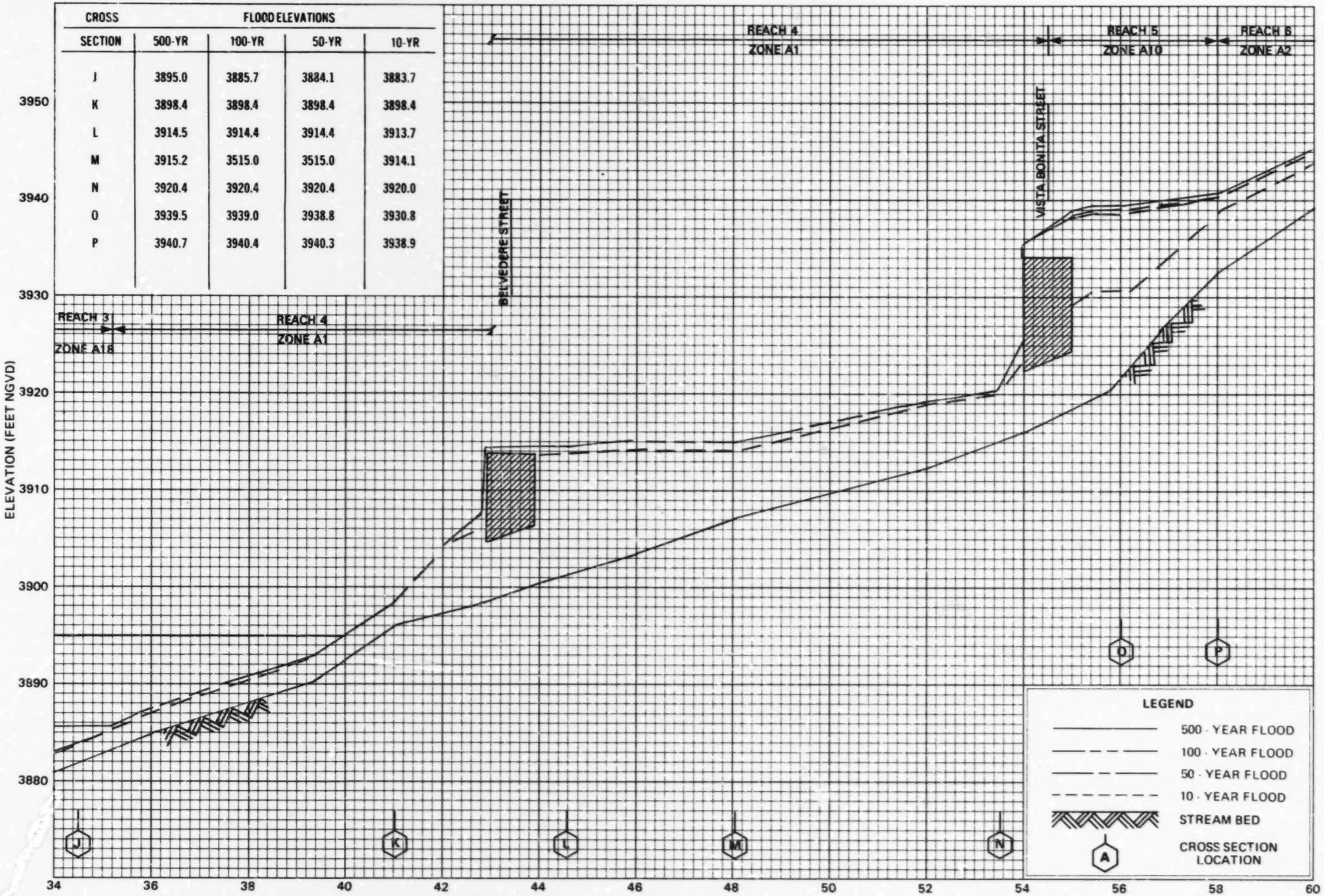
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

33P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
J	3895.0	3885.7	3884.1	3883.7
K	3898.4	3898.4	3898.4	3898.4
L	3914.5	3914.4	3914.4	3913.7
M	3915.2	3515.0	3515.0	3914.1
N	3920.4	3920.4	3920.4	3920.0
O	3939.5	3939.0	3938.8	3930.8
P	3940.7	3940.4	3940.3	3938.9



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

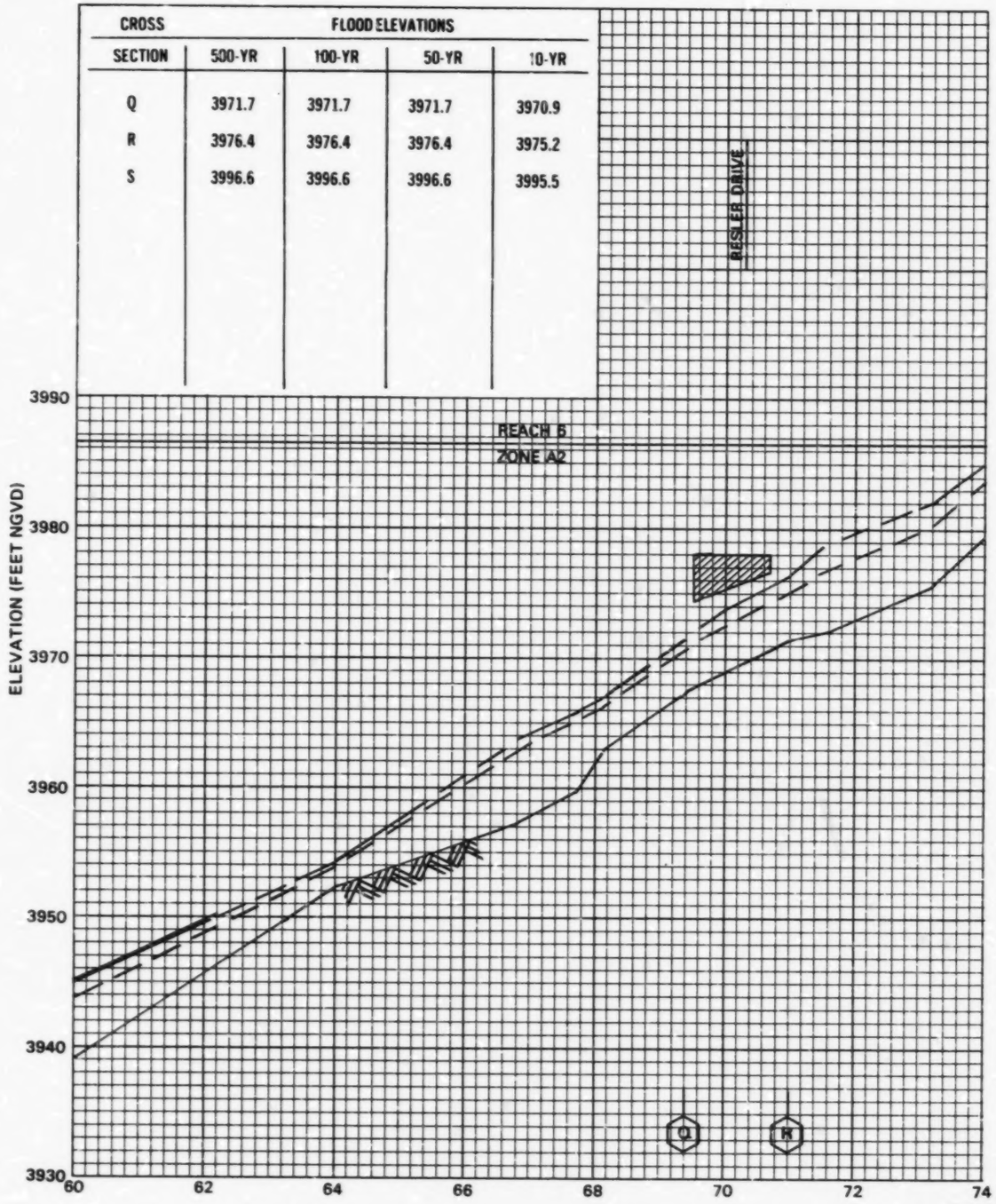
FEDERAL EMERGENCY MANAGEMENT AGENCY

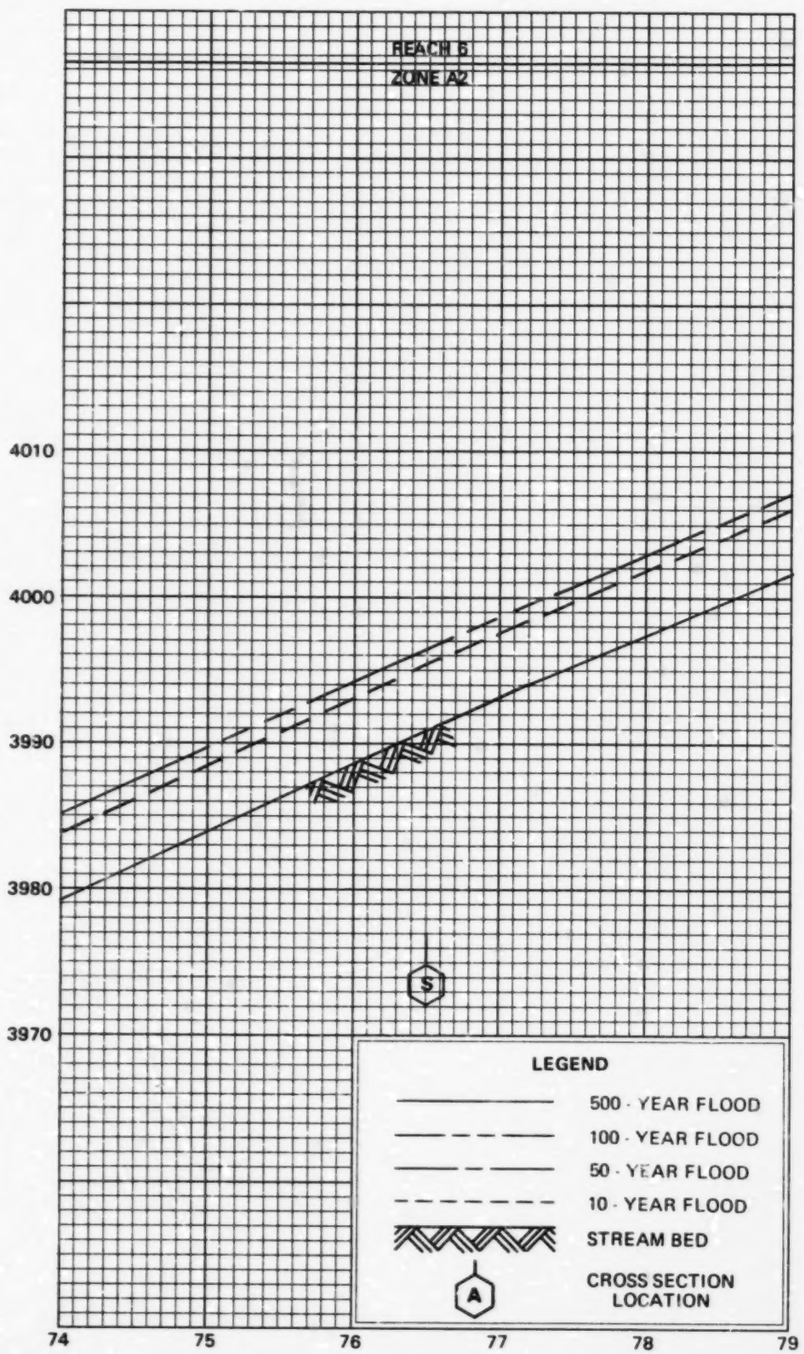
CITY OF EL PASO, TX
(EL PASO CO.)

34P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
Q	3971.7	3971.7	3971.7	3970.9
R	3976.4	3976.4	3976.4	3975.2
S	3996.6	3996.6	3996.6	3995.5





STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

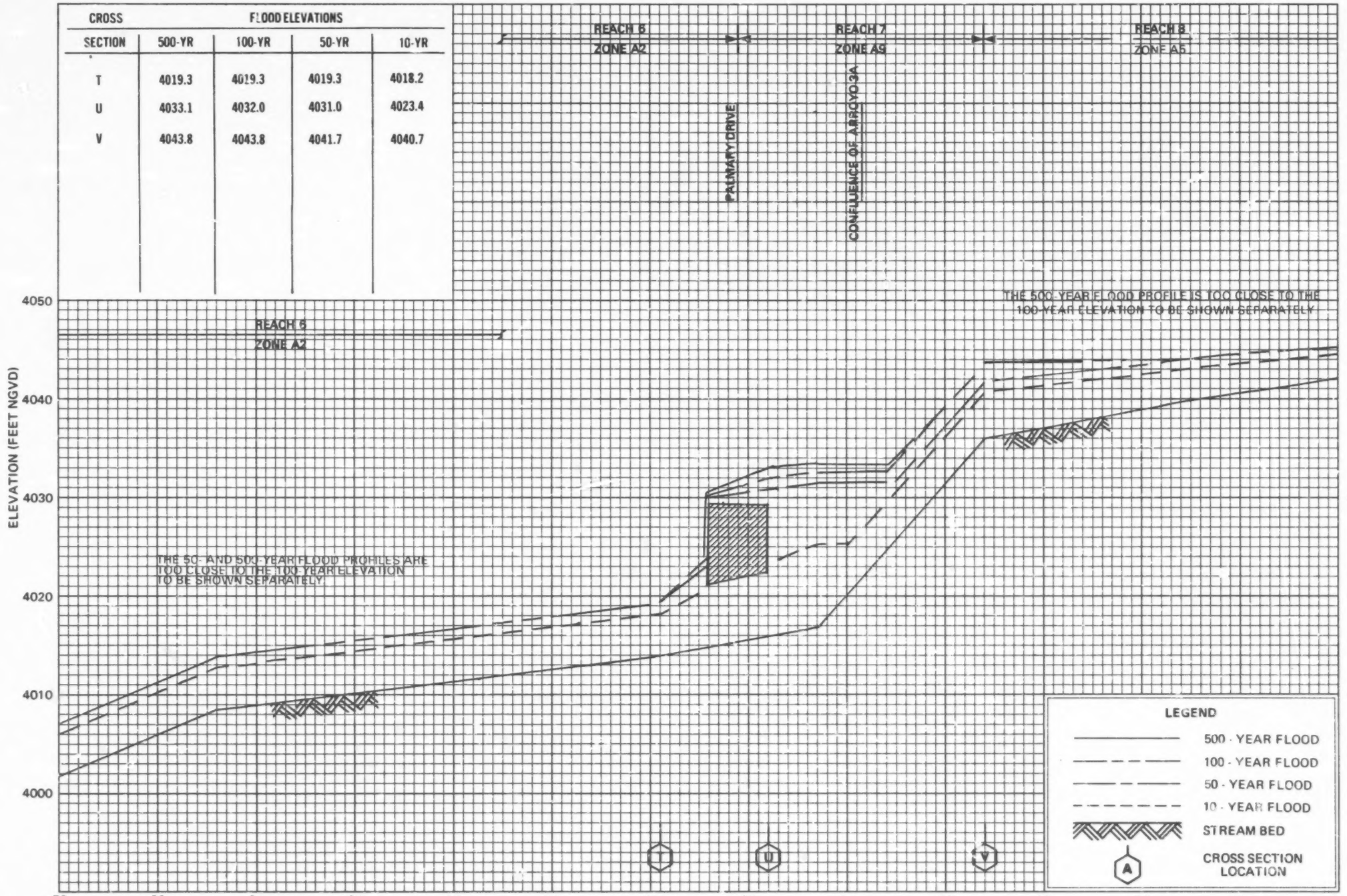
CITY OF EL PASO, TX
(EL PASO CO.)

35P

99

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
T	4019.3	4019.3	4019.3	4018.2
U	4033.1	4032.0	4031.0	4023.4
V	4043.8	4043.8	4041.7	4040.7



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

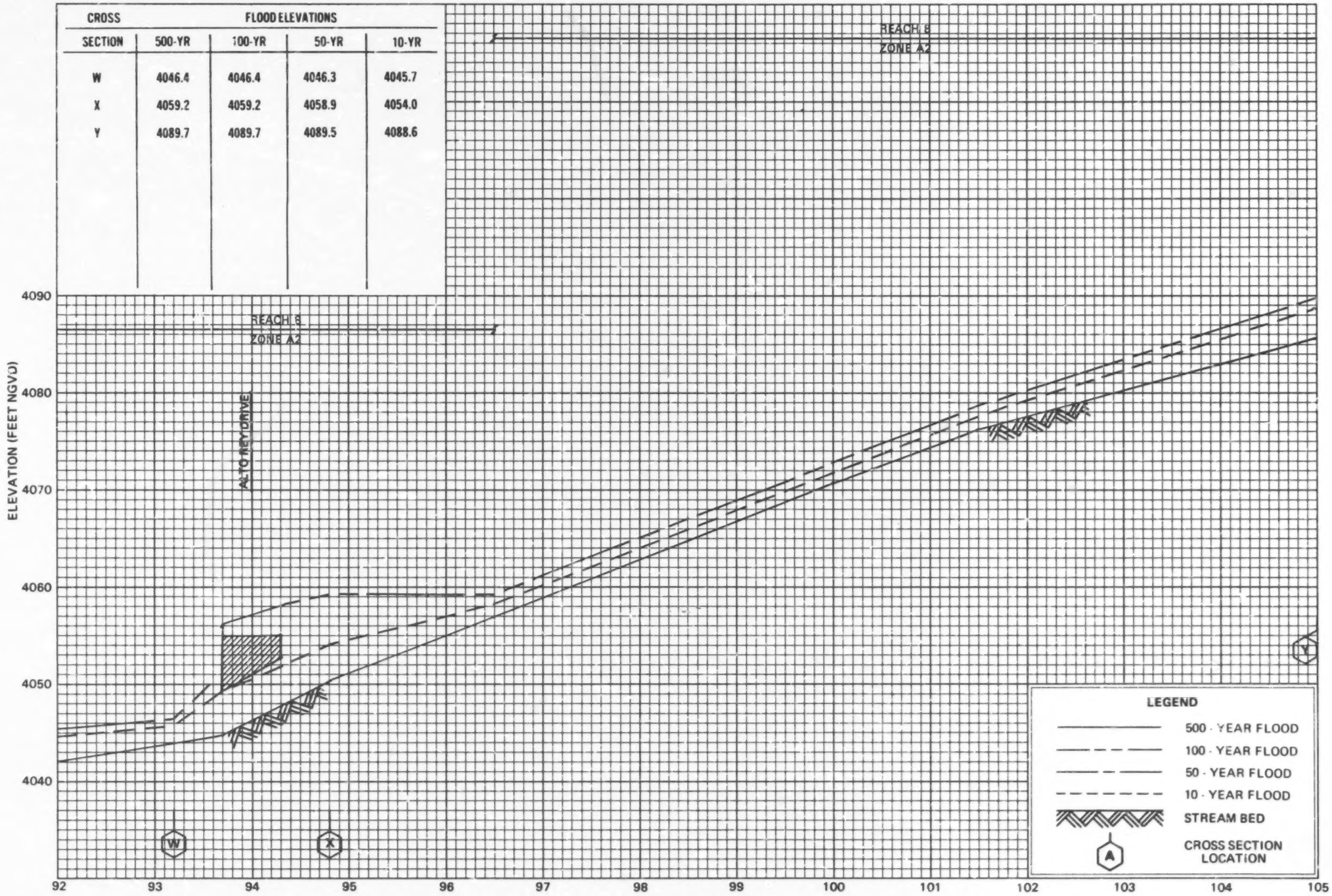
CITY OF EL PASO, TX
(EL PASO CO.)

36P

100

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
W	4046.4	4046.4	4046.3	4045.7
X	4059.2	4059.2	4058.9	4054.0
Y	4089.7	4089.7	4089.5	4088.6



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

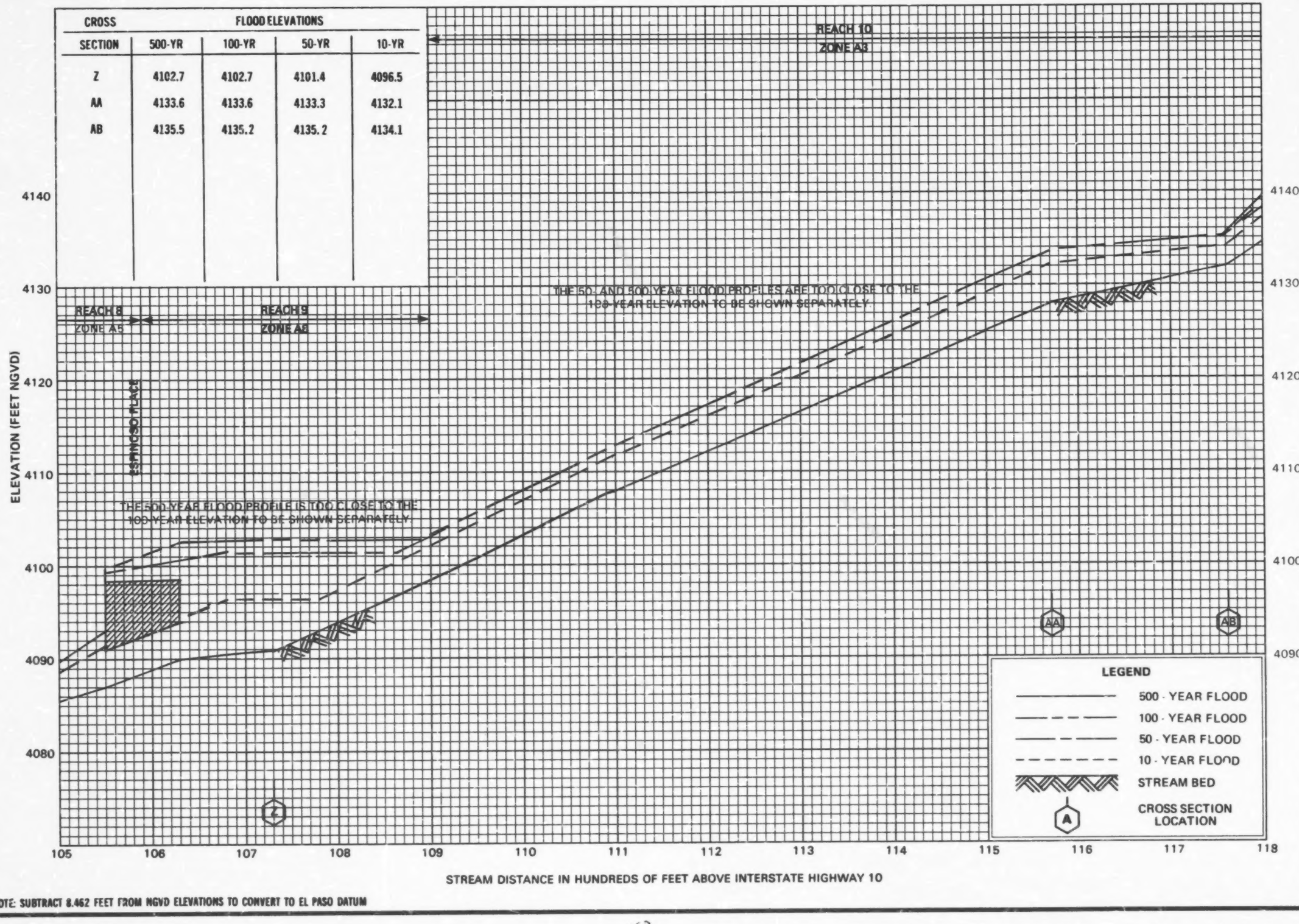
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

37P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
Z	4102.7	4102.7	4101.4	4096.5
AA	4133.6	4133.6	4133.3	4132.1
AB	4135.5	4135.2	4135.2	4134.1



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

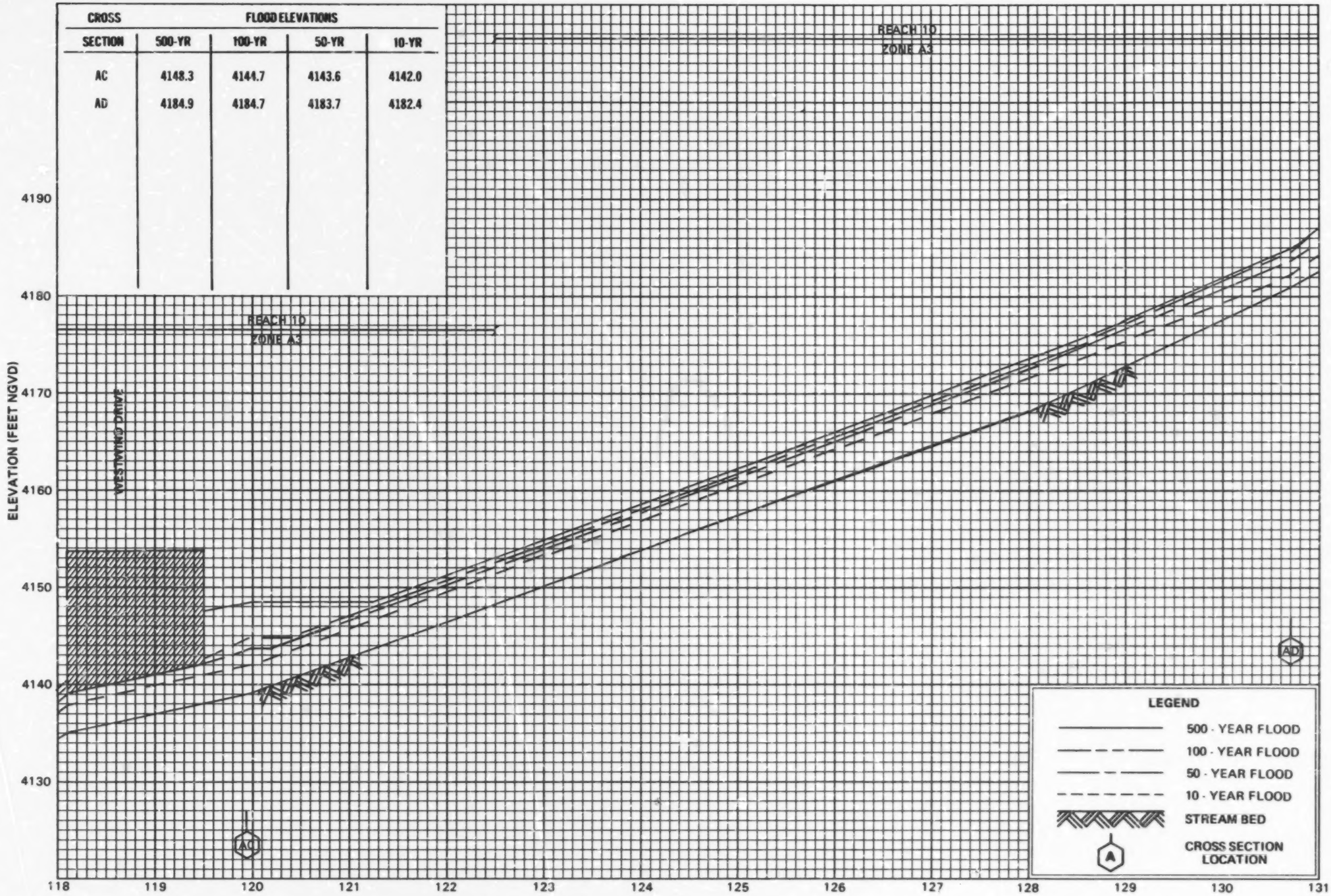
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

38P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AC	4148.3	4144.7	4143.6	4142.0
AD	4184.9	4184.7	4183.7	4182.4



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

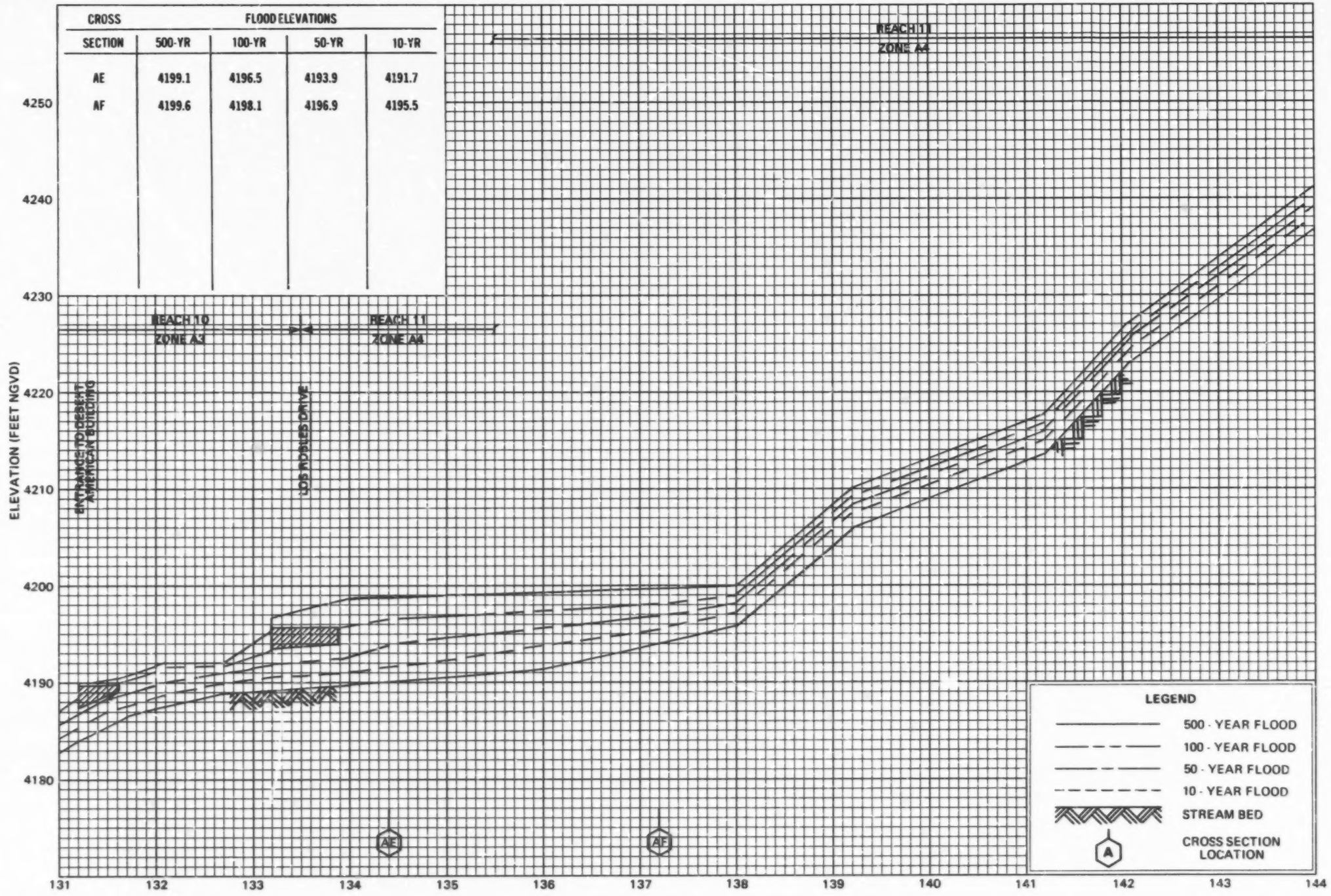
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

39P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AE	4199.1	4196.5	4193.9	4191.7
AF	4199.6	4198.1	4196.9	4195.5



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

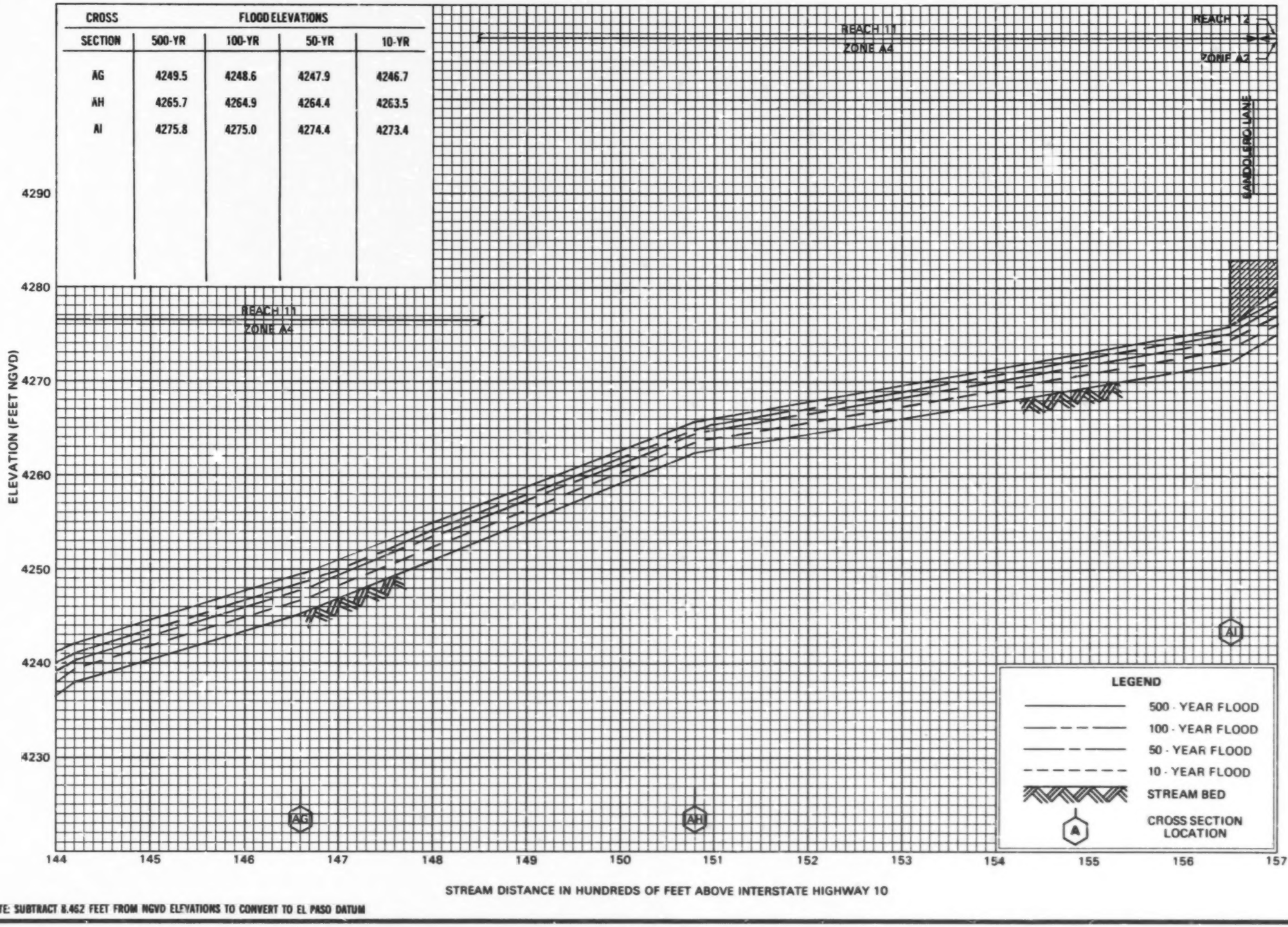
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

40P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AG	4249.5	4248.6	4247.9	4246.7
AH	4265.7	4264.9	4264.4	4263.5
AI	4275.8	4275.0	4274.4	4273.4



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

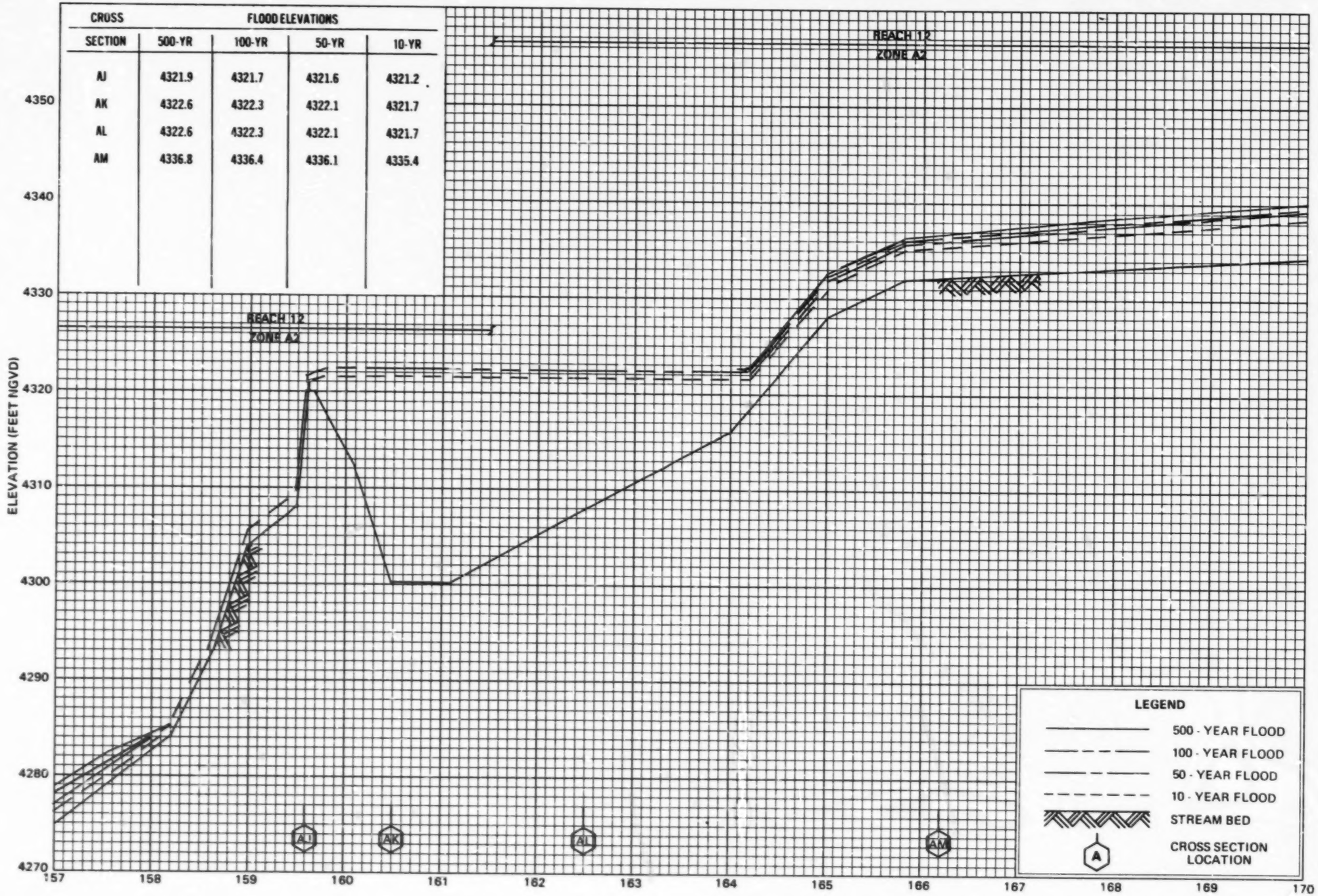
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

41P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AJ	4321.9	4321.7	4321.6	4321.2
AK	4322.6	4322.3	4322.1	4321.7
AL	4322.6	4322.3	4322.1	4321.7
AM	4336.8	4336.4	4336.1	4335.4



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

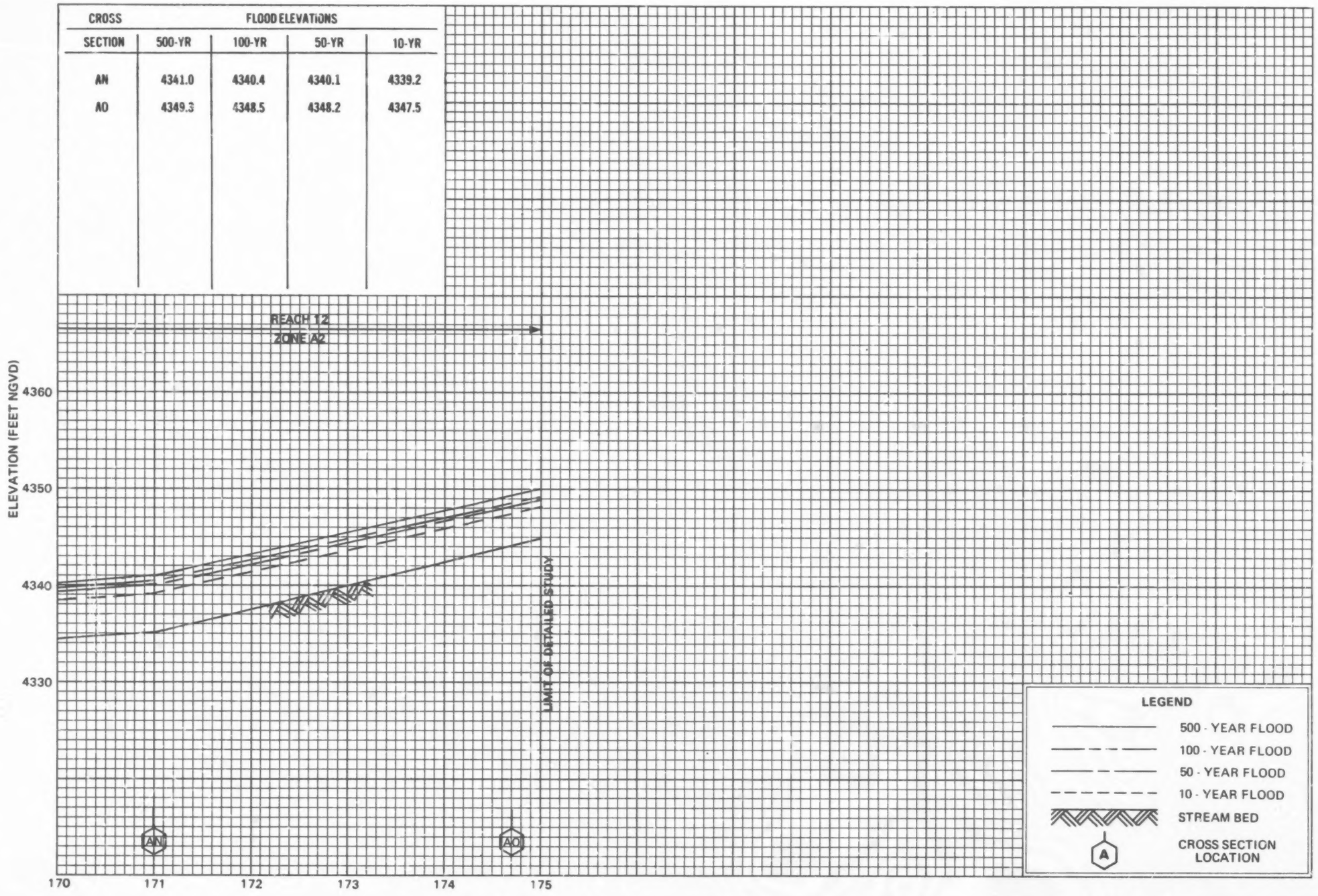
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

42P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
AN	4341.0	4340.4	4340.1	4339.2
AO	4349.3	4348.5	4348.2	4347.5



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3

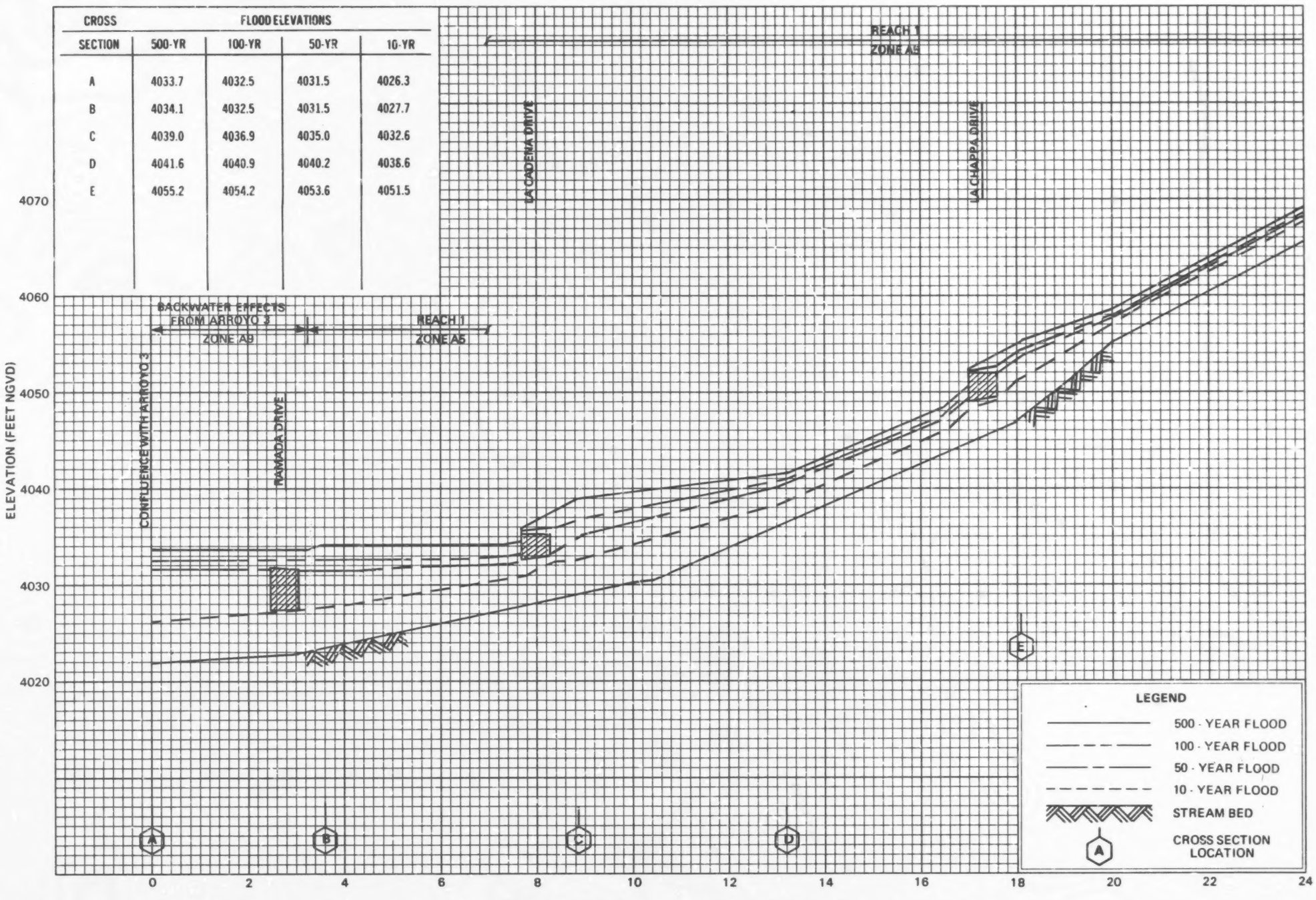
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

43P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
A	4033.7	4032.5	4031.5	4026.3
B	4034.1	4032.5	4031.5	4027.7
C	4039.0	4036.9	4035.0	4032.6
D	4041.6	4040.9	4040.2	4038.6
E	4055.2	4054.2	4053.6	4051.5



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3A

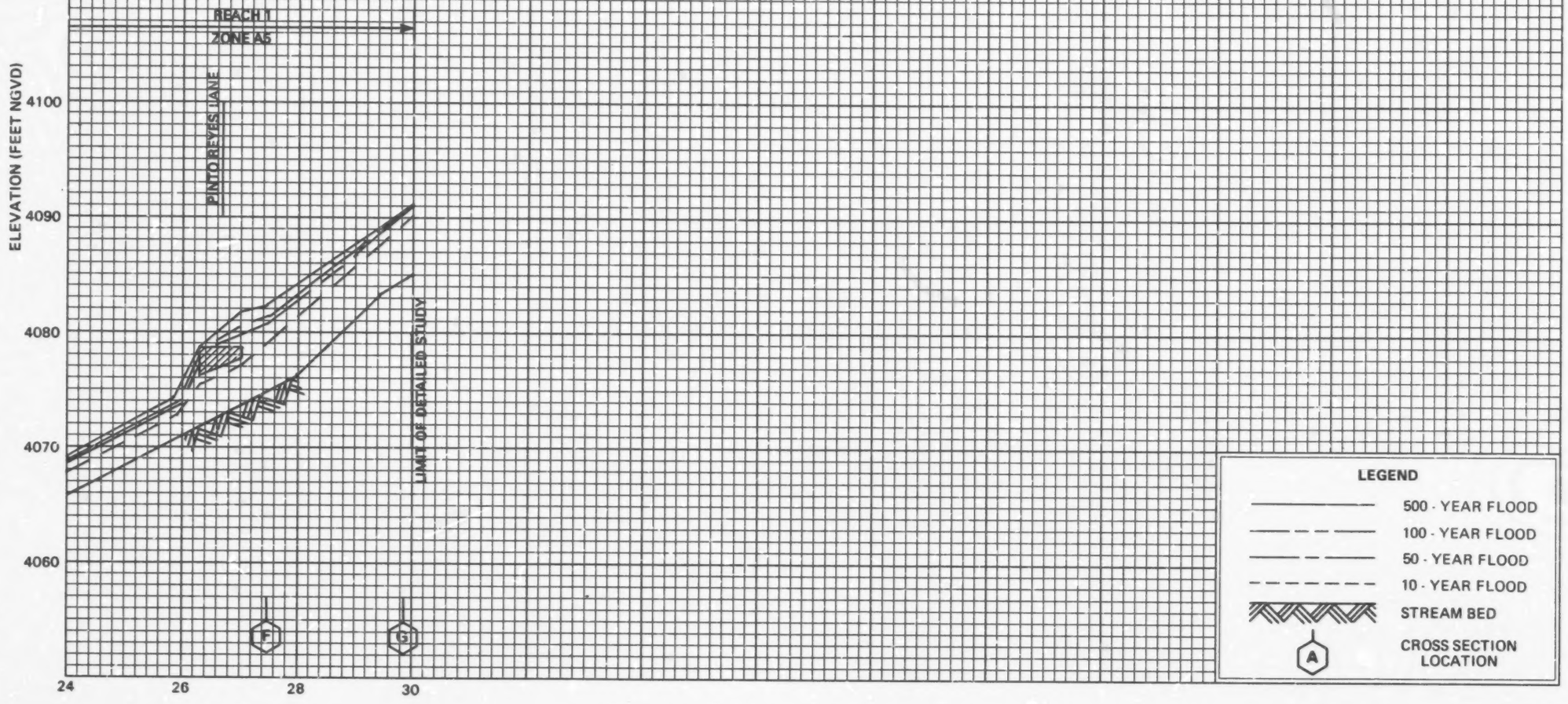
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

44P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
F	4082.3	4081.3	4080.8	4079.2
G	4090.8	4090.3	4090.1	4089.4



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3A

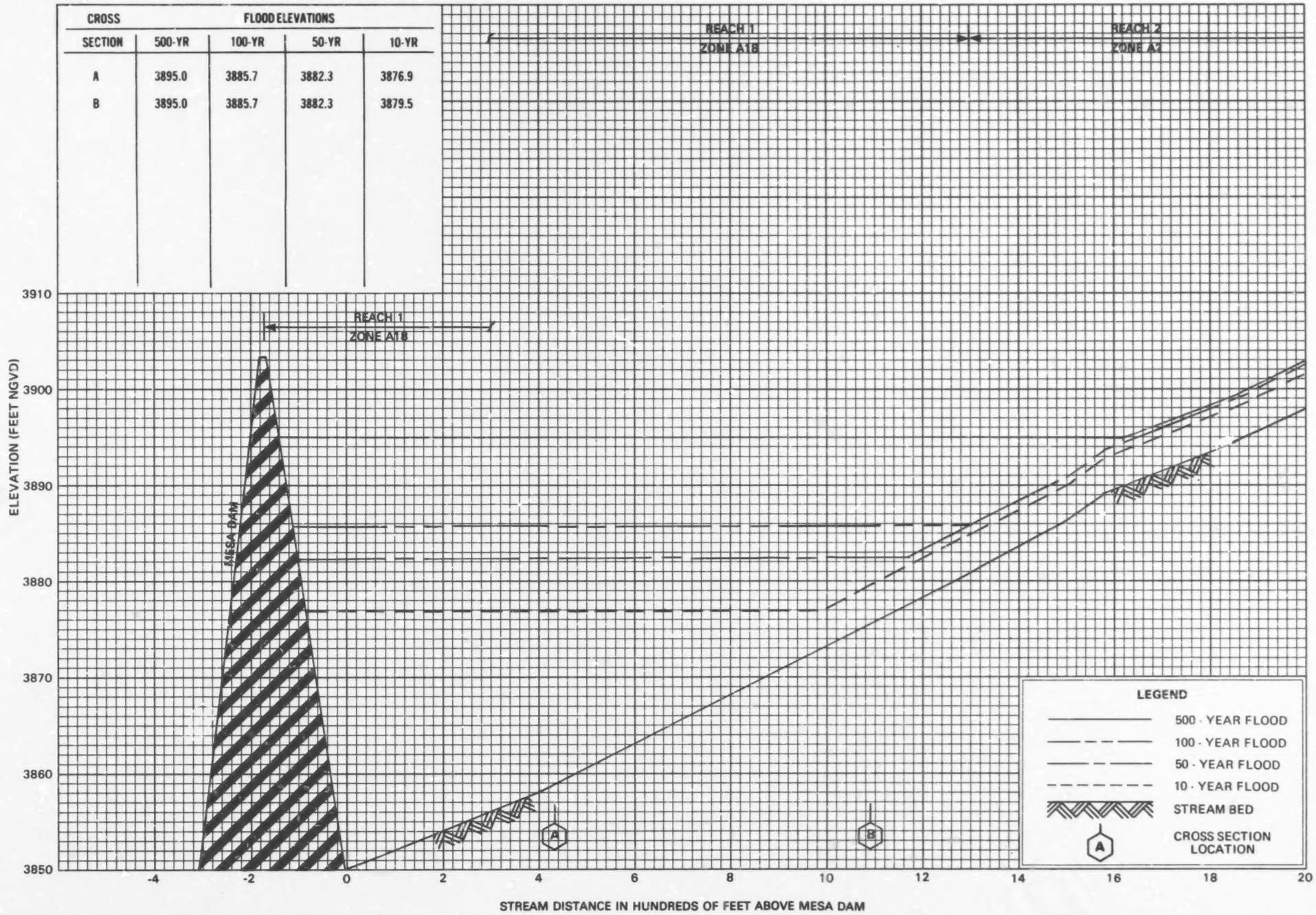
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

45P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
A	3895.0	3885.7	3882.3	3876.9
B	3895.0	3885.7	3882.3	3879.5



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3B

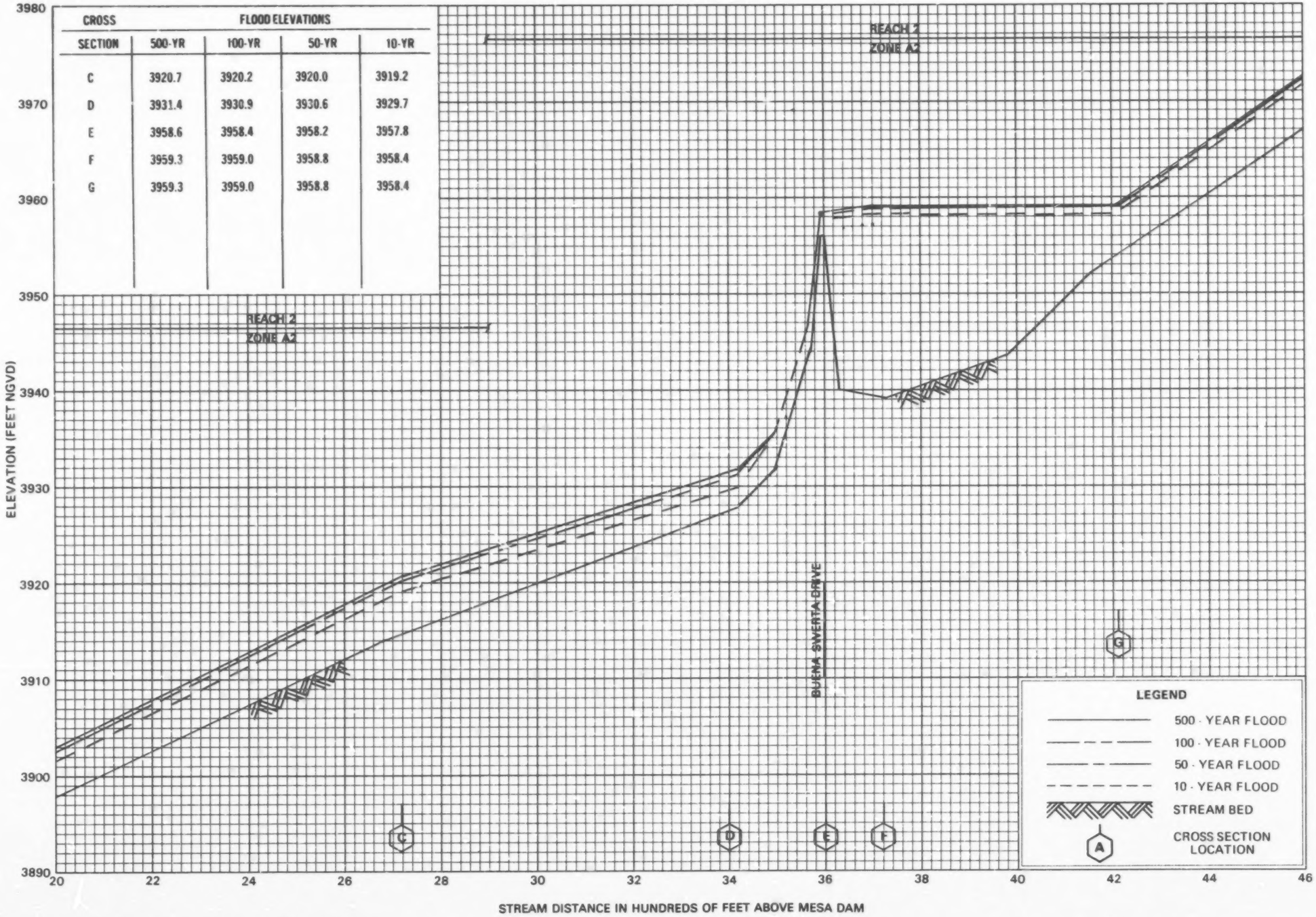
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

46P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
C	3920.7	3920.2	3920.0	3919.2
D	3931.4	3930.9	3930.6	3929.7
E	3958.6	3958.4	3958.2	3957.8
F	3959.3	3959.0	3958.8	3958.4
G	3959.3	3959.0	3958.8	3958.4



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3B

FEDERAL EMERGENCY MANAGEMENT AGENCY

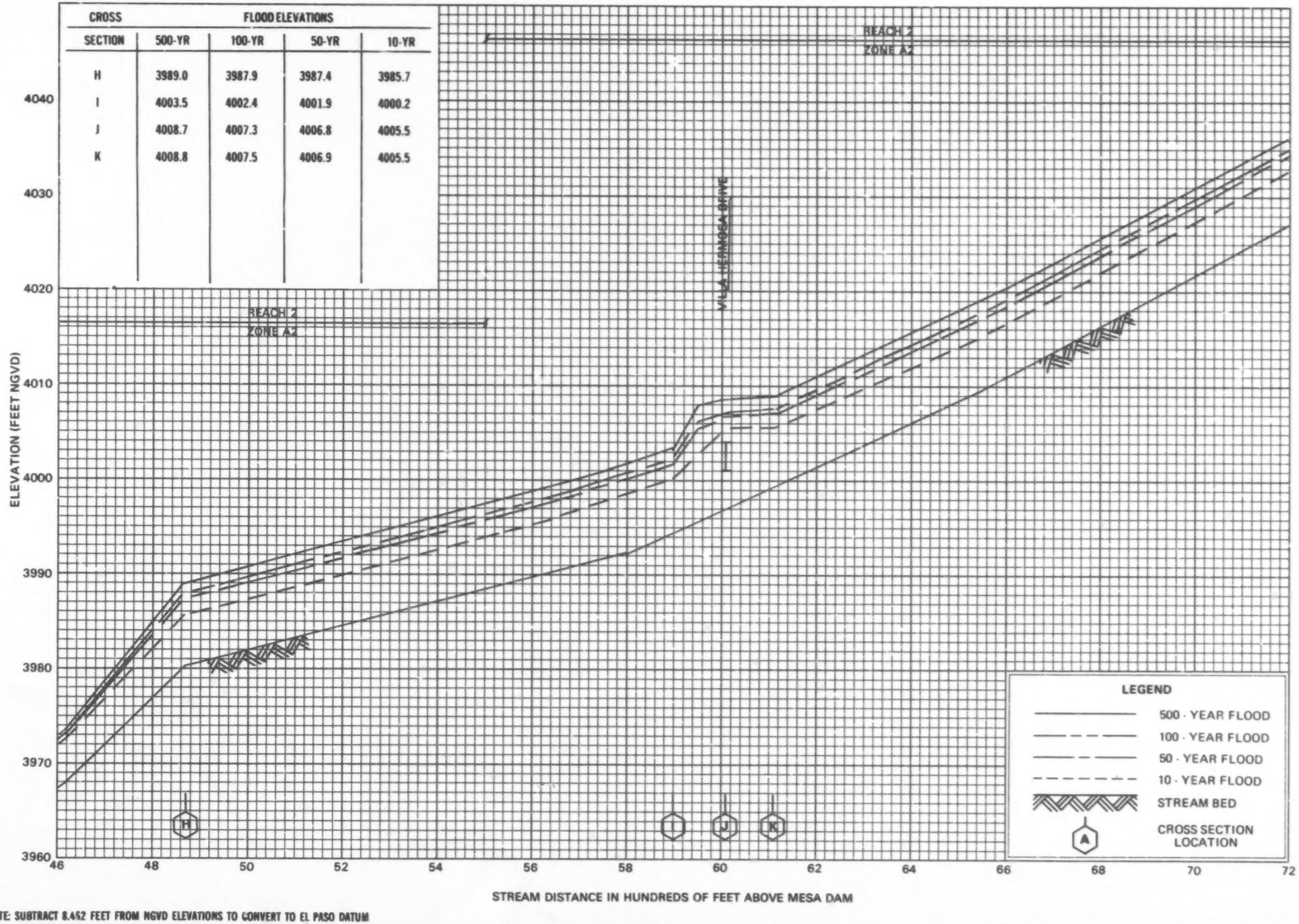
CITY OF EL PASO, TX
(EL PASO CO.)

47P

///

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
H	3989.0	3987.9	3987.4	3985.7
I	4003.5	4002.4	4001.9	4000.2
J	4008.7	4007.3	4006.8	4005.5
K	4008.8	4007.5	4006.9	4005.5



NOTE: SUBTRACT 8.452 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3B

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

48P

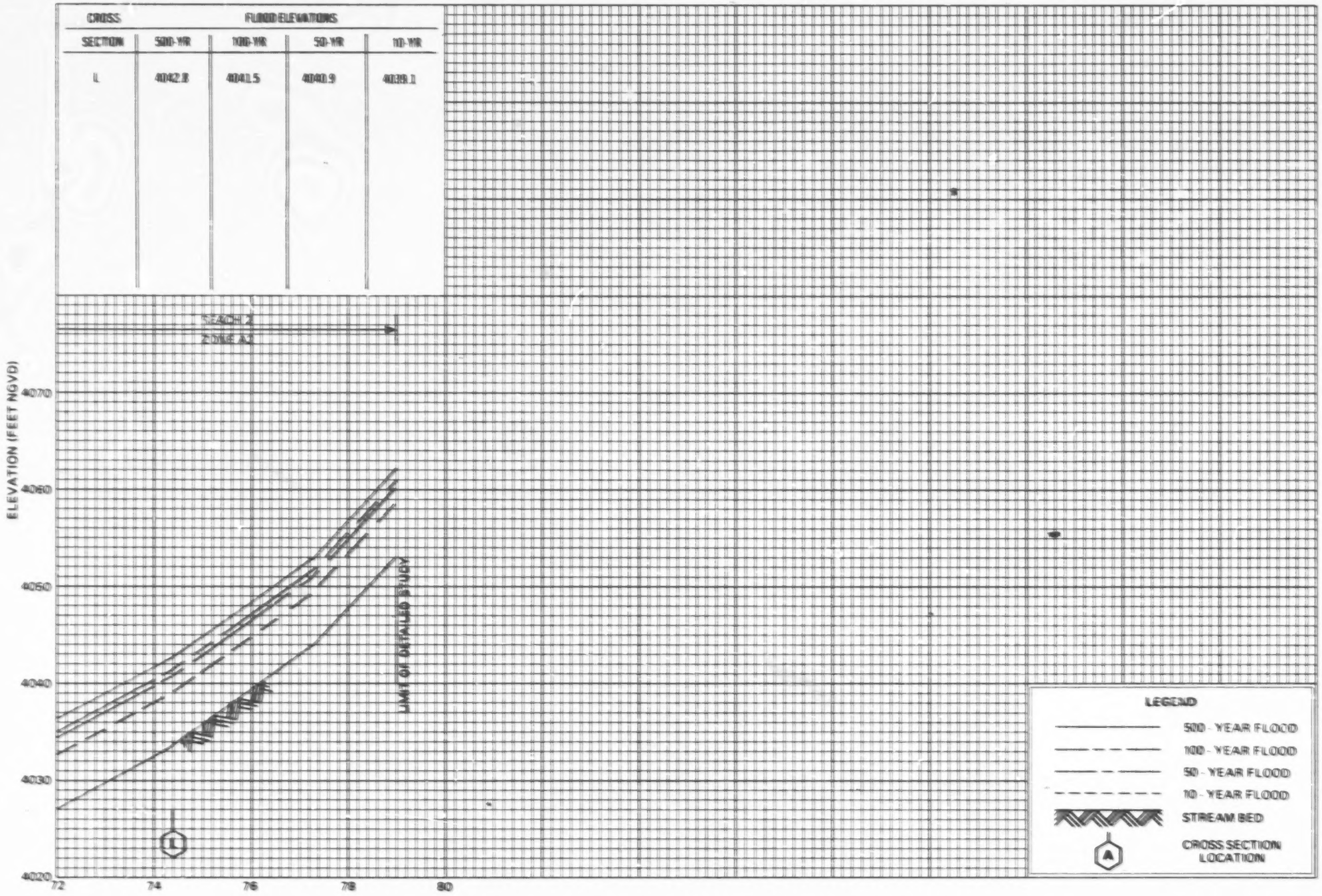
BEST COPY AVAILABLE

BLANK PAGE

BLANK PAGE

BLANK PAGE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
L	4042.8	4041.5	4040.9	4038.1



NOTE: SUBTRACT 3.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 3B

FEDERAL EMERGENCY MANAGEMENT AGENCY

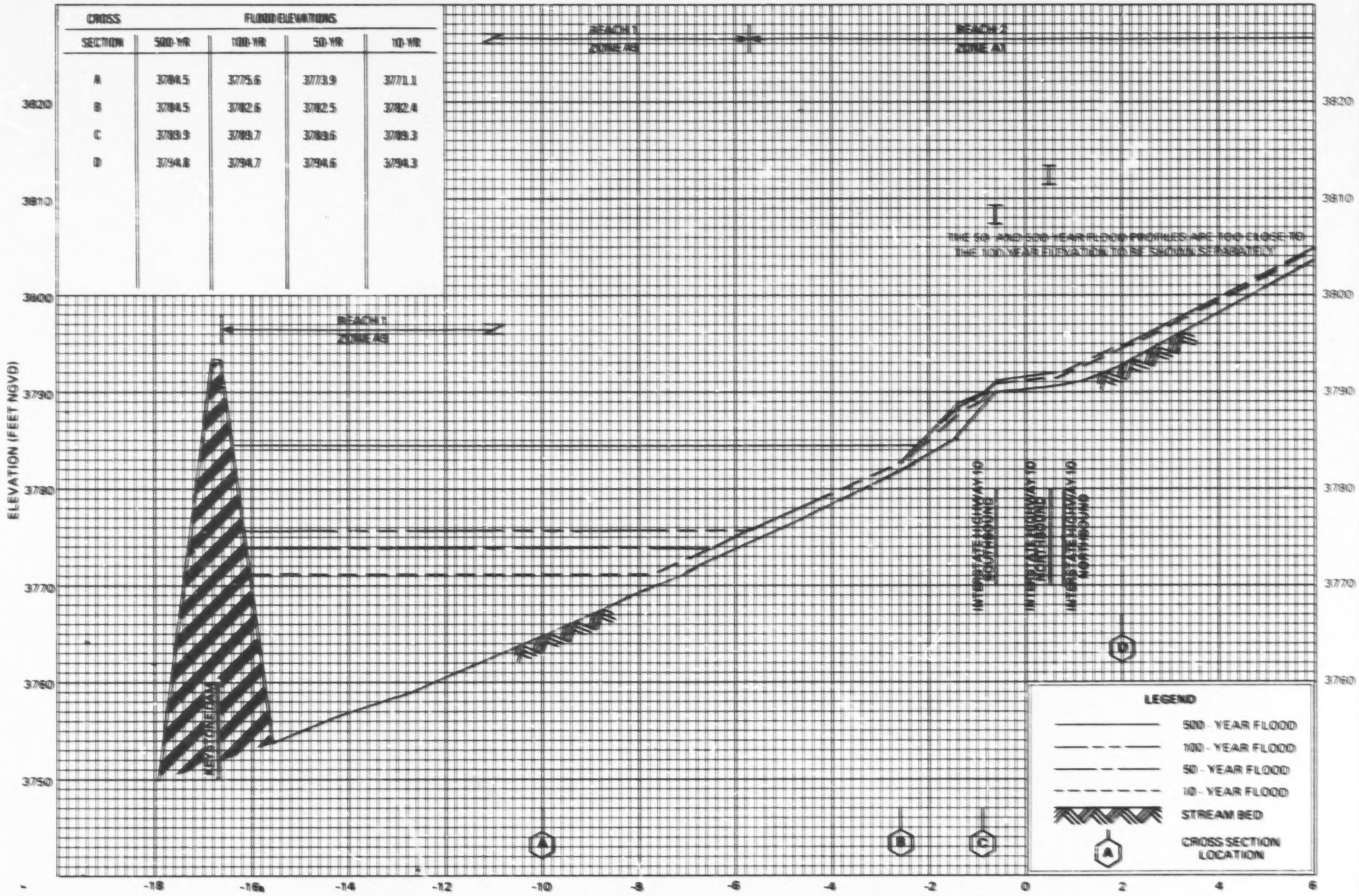
CITY OF EL PASO, TX

(EL PASO CO.)

49P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
A	3784.5	3775.6	3773.9	3771.1
B	3784.5	3782.6	3782.5	3782.4
C	3789.9	3789.7	3789.6	3789.3
D	3794.8	3794.7	3794.6	3794.3



NOTE: SUBTRACT 0.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 4

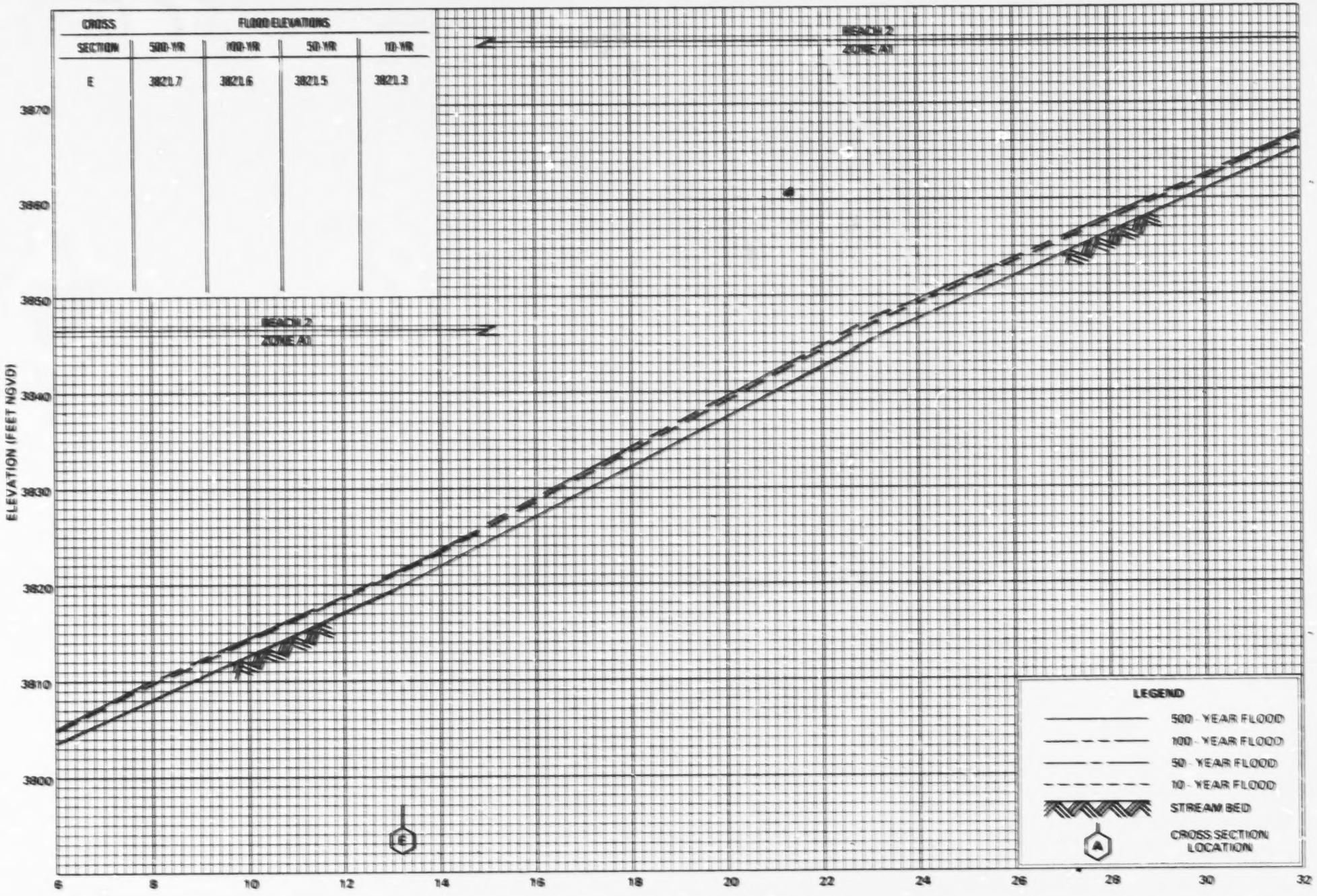
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

50P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
E	3821.7	3821.6	3821.5	3821.3



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 4

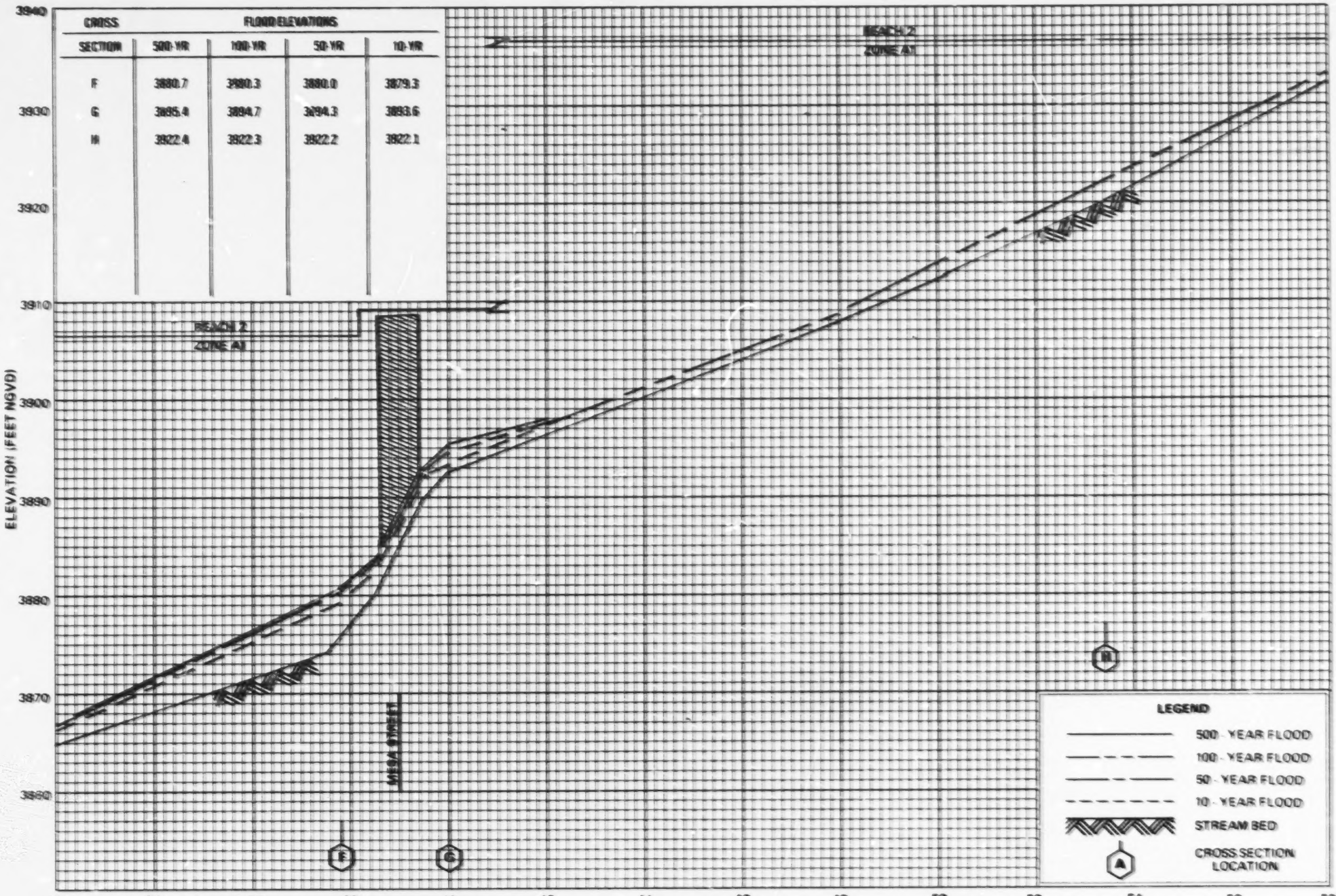
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

51P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
F	3880.7	3880.3	3880.0	3879.3
G	3895.4	3894.7	3894.3	3893.6
H	3922.4	3922.3	3922.2	3922.1



NOTE: SUBTRACT 3.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 4

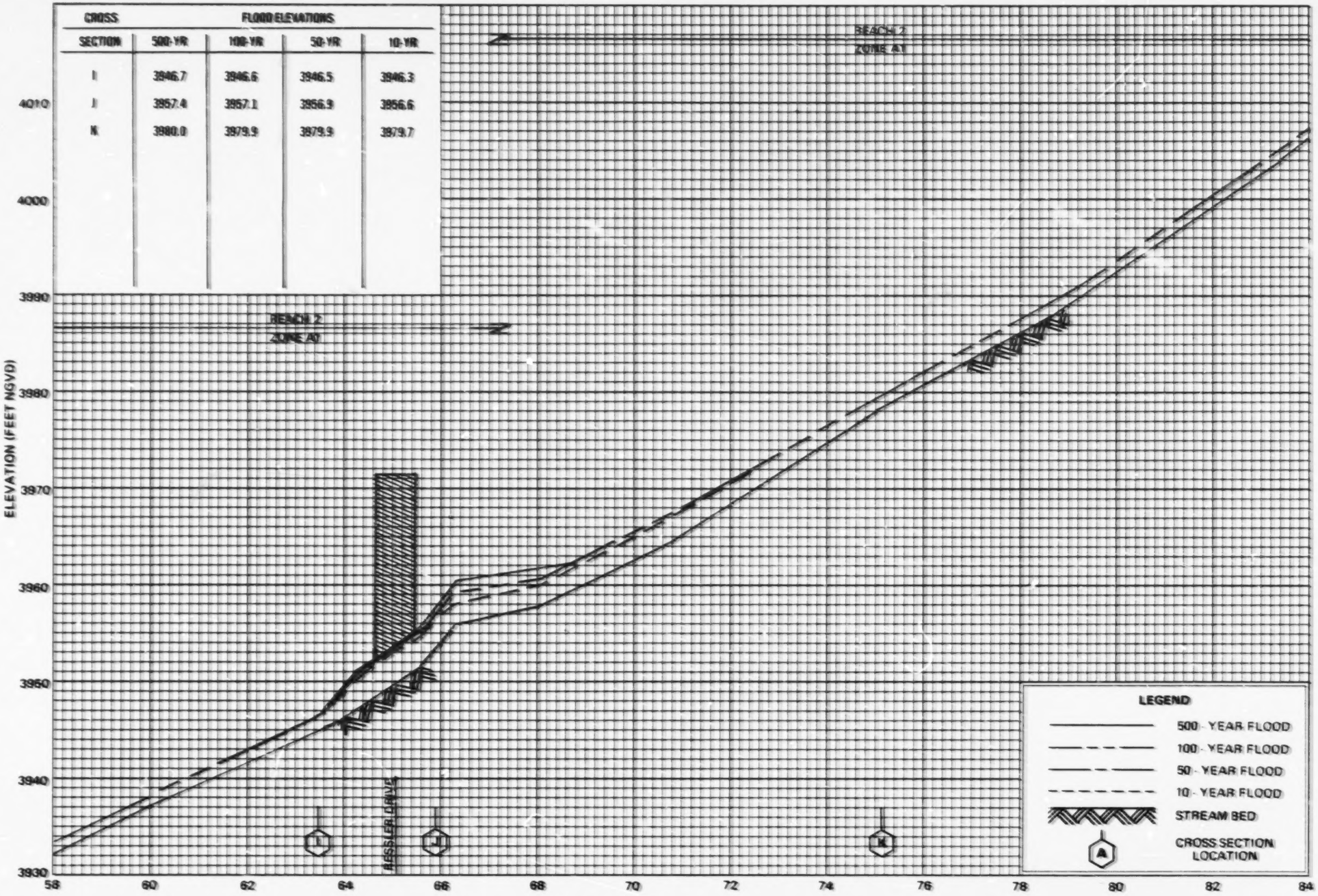
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

52P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
I	3946.7	3946.6	3946.5	3946.3
J	3957.4	3957.1	3956.9	3956.6
K	3980.0	3979.9	3979.9	3979.7



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 4

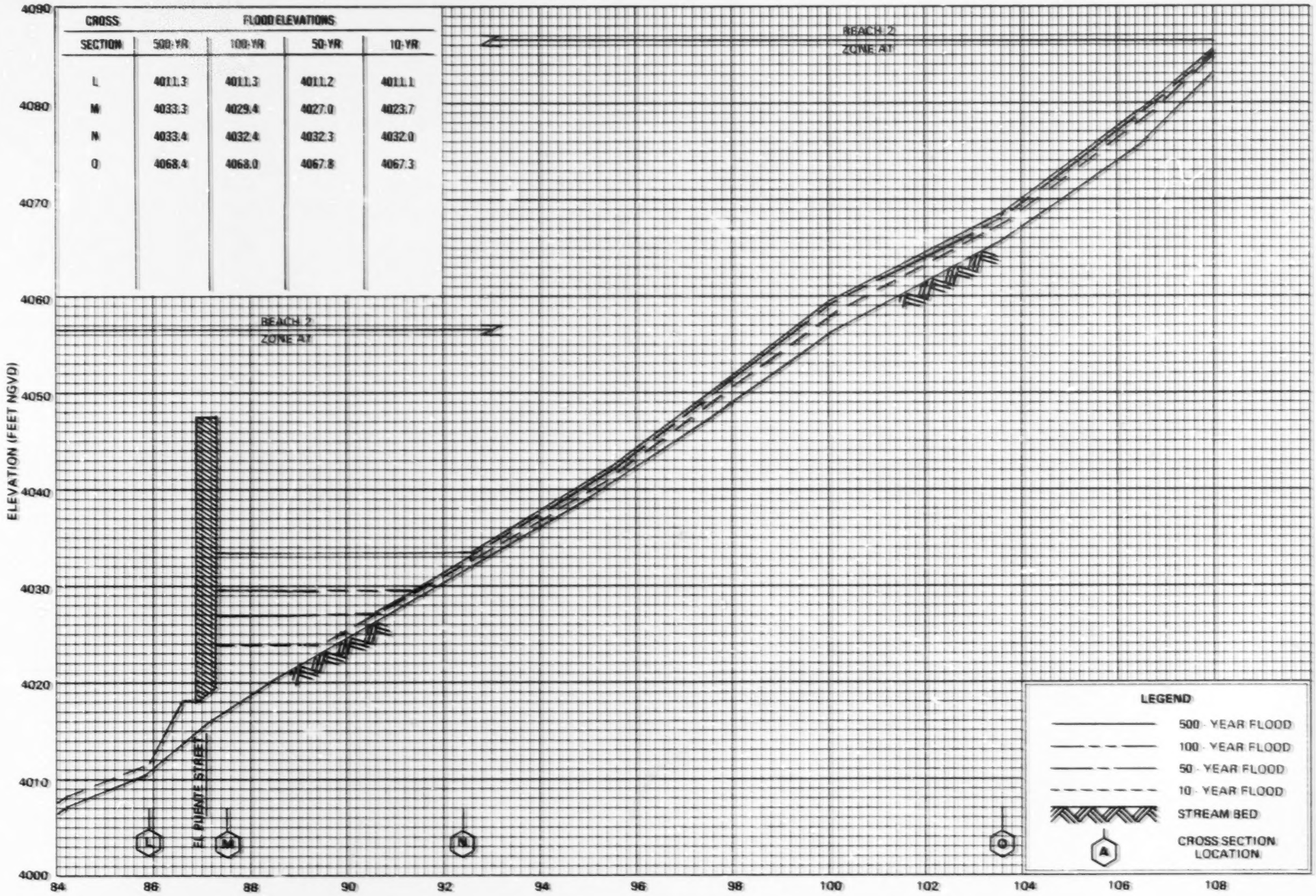
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

53P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
L	4011.3	4011.3	4011.2	4011.1
M	4033.3	4029.4	4027.0	4023.7
N	4033.4	4032.4	4032.3	4032.0
O	4068.4	4068.0	4067.8	4067.3



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 4

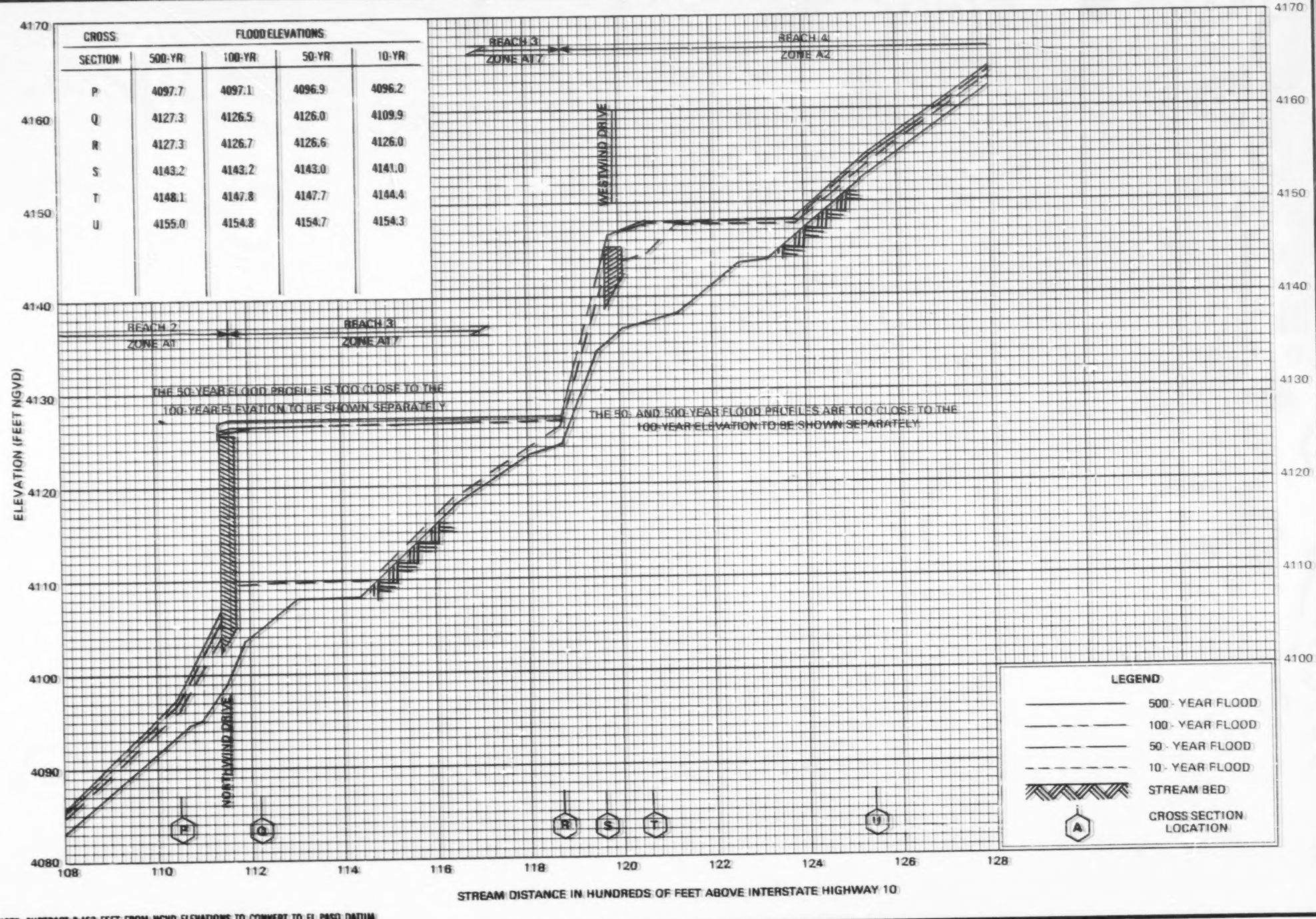
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

54P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
P	4097.7	4097.1	4096.9	4096.2
Q	4127.3	4126.5	4126.0	4109.9
R	4127.3	4126.7	4126.6	4126.0
S	4143.2	4143.2	4143.0	4141.0
T	4148.1	4147.8	4147.7	4144.4
U	4155.0	4154.8	4154.7	4154.3



NOTE: SUBTRACT 8,462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 4

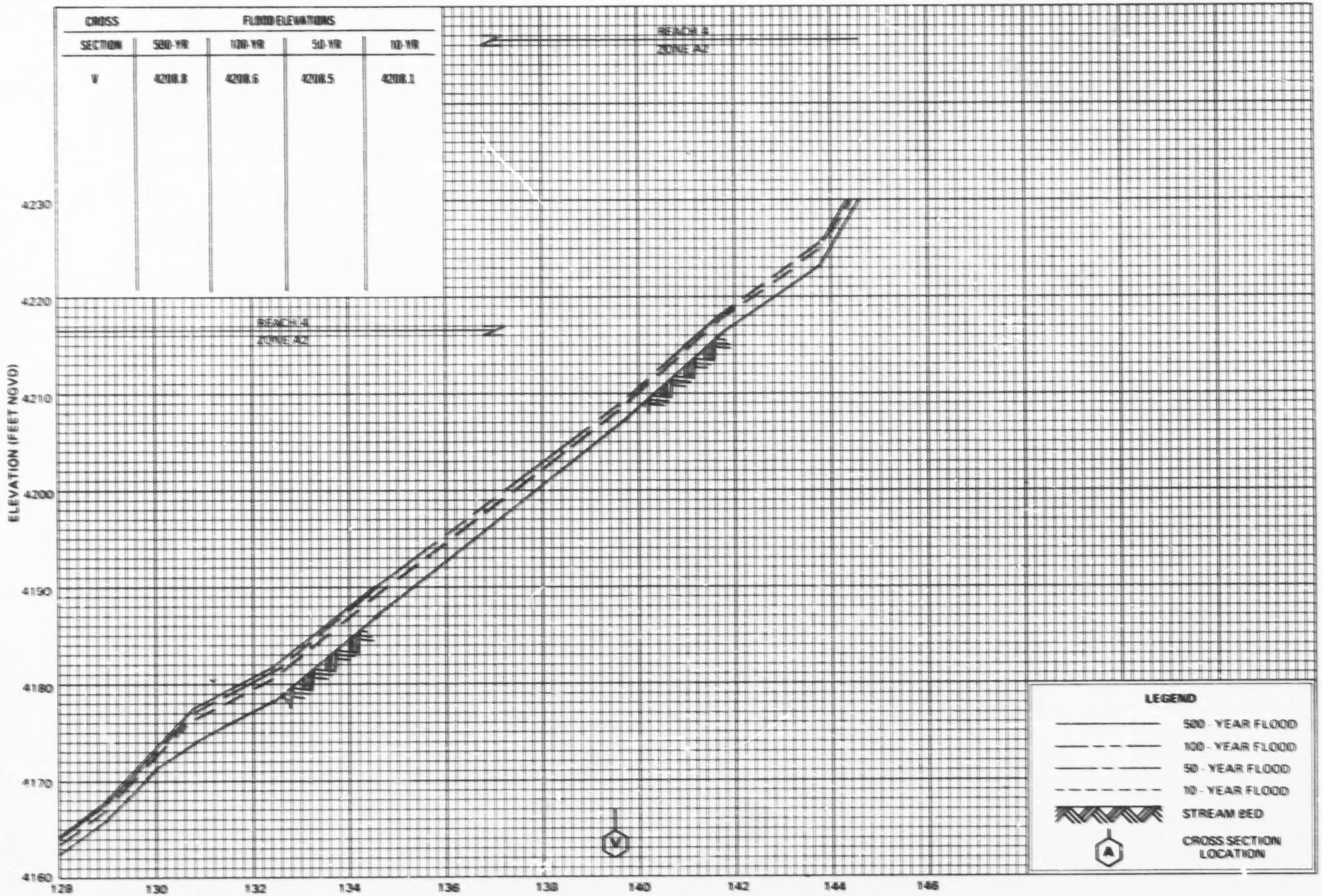
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

55P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
V	4208.8	4208.6	4208.5	4208.1



STREAM DISTANCE IN HUNDREDS OF FEET ABOVE INTERSTATE HIGHWAY 10

NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 4

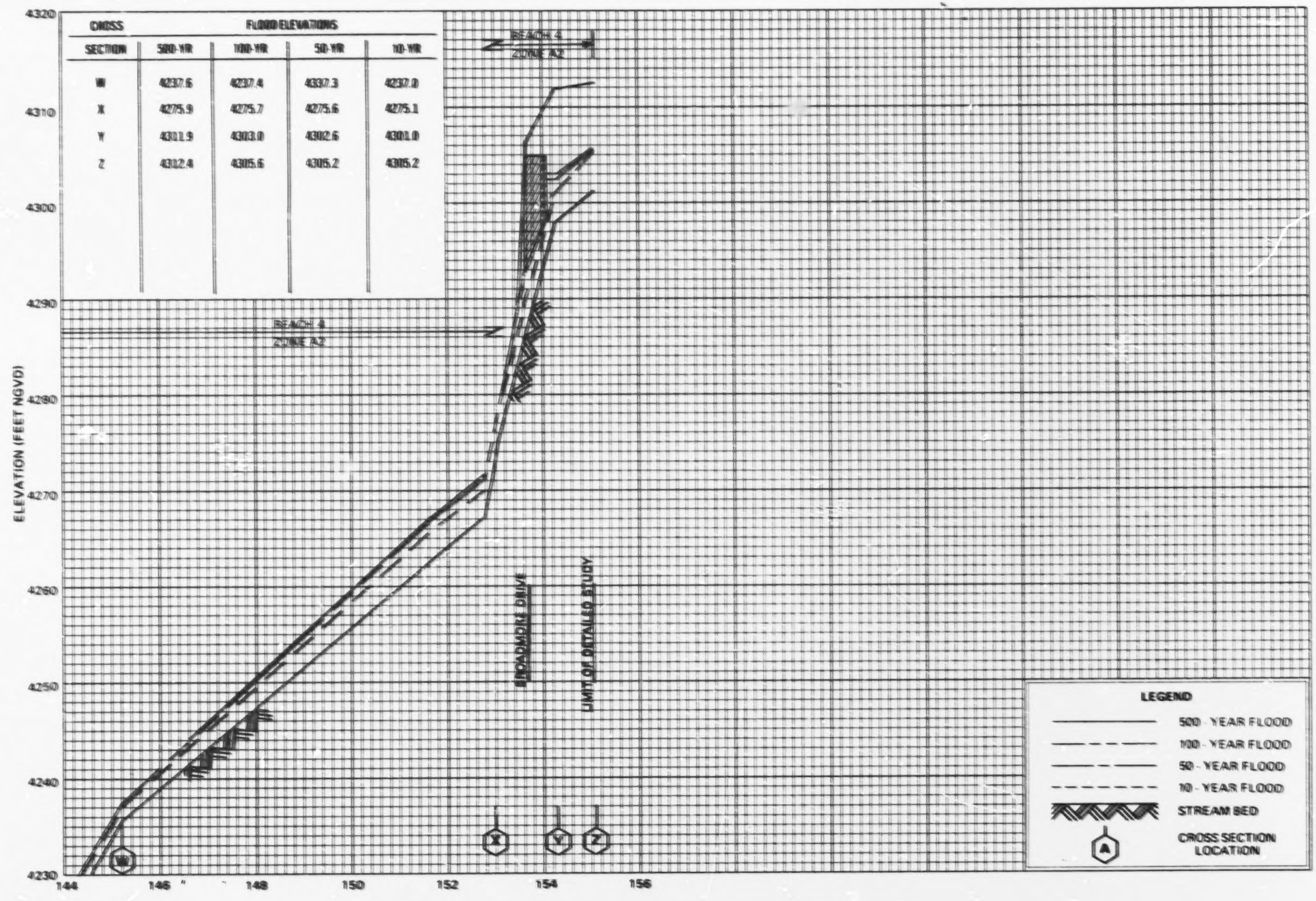
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

56P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
W	4237.6	4237.4	4337.3	4237.0
X	4275.9	4275.7	4275.6	4275.1
Y	4301.9	4303.0	4302.6	4301.0
Z	4312.4	4315.6	4315.2	4315.2



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 4

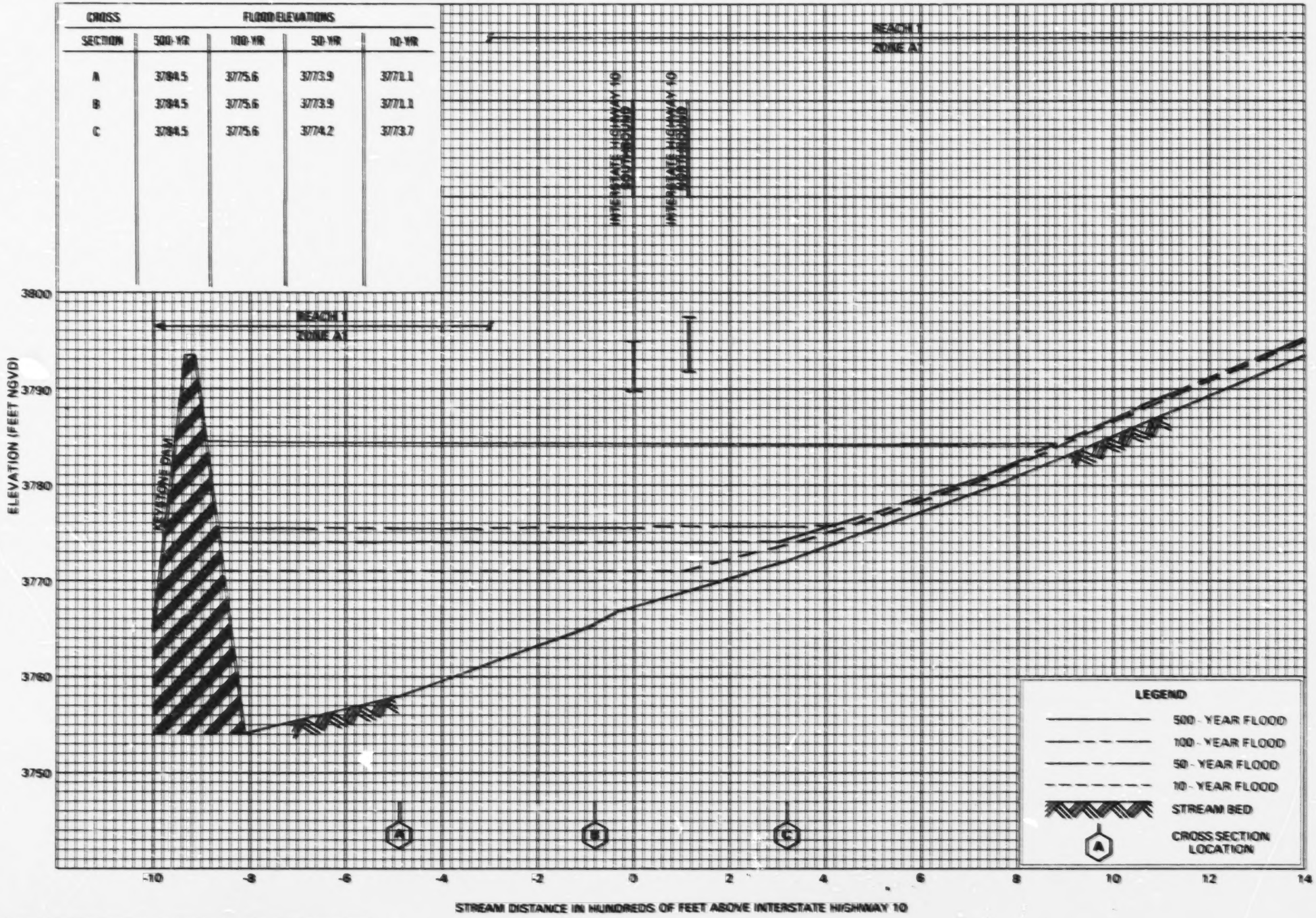
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

57P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
A	3784.5	3775.6	3773.9	3771.1
B	3784.5	3775.6	3773.9	3771.1
C	3784.5	3775.6	3774.2	3773.7



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 5

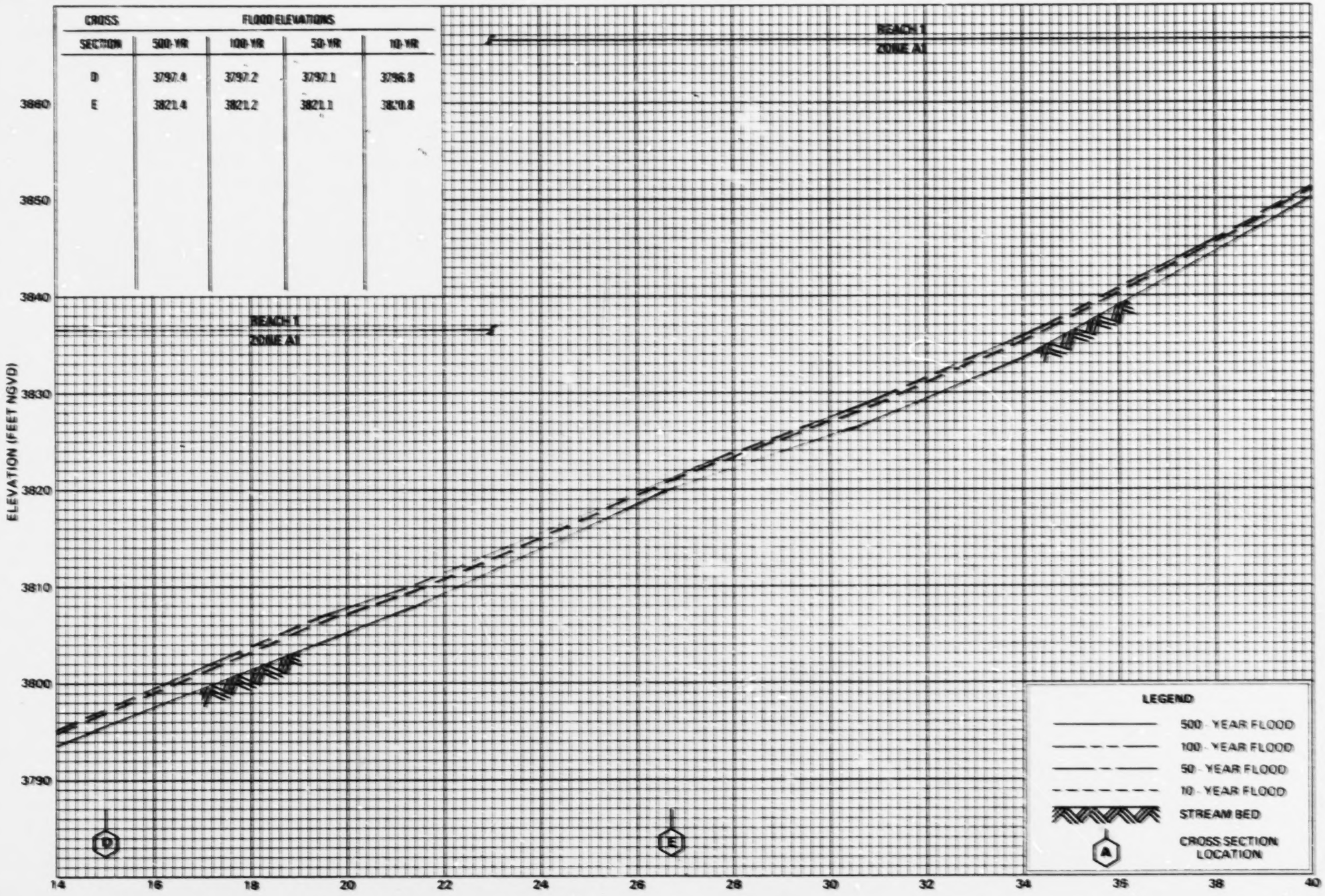
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

58P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
D	3797.4	3797.2	3797.1	3796.8
E	3821.4	3821.2	3821.1	3820.8



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 5

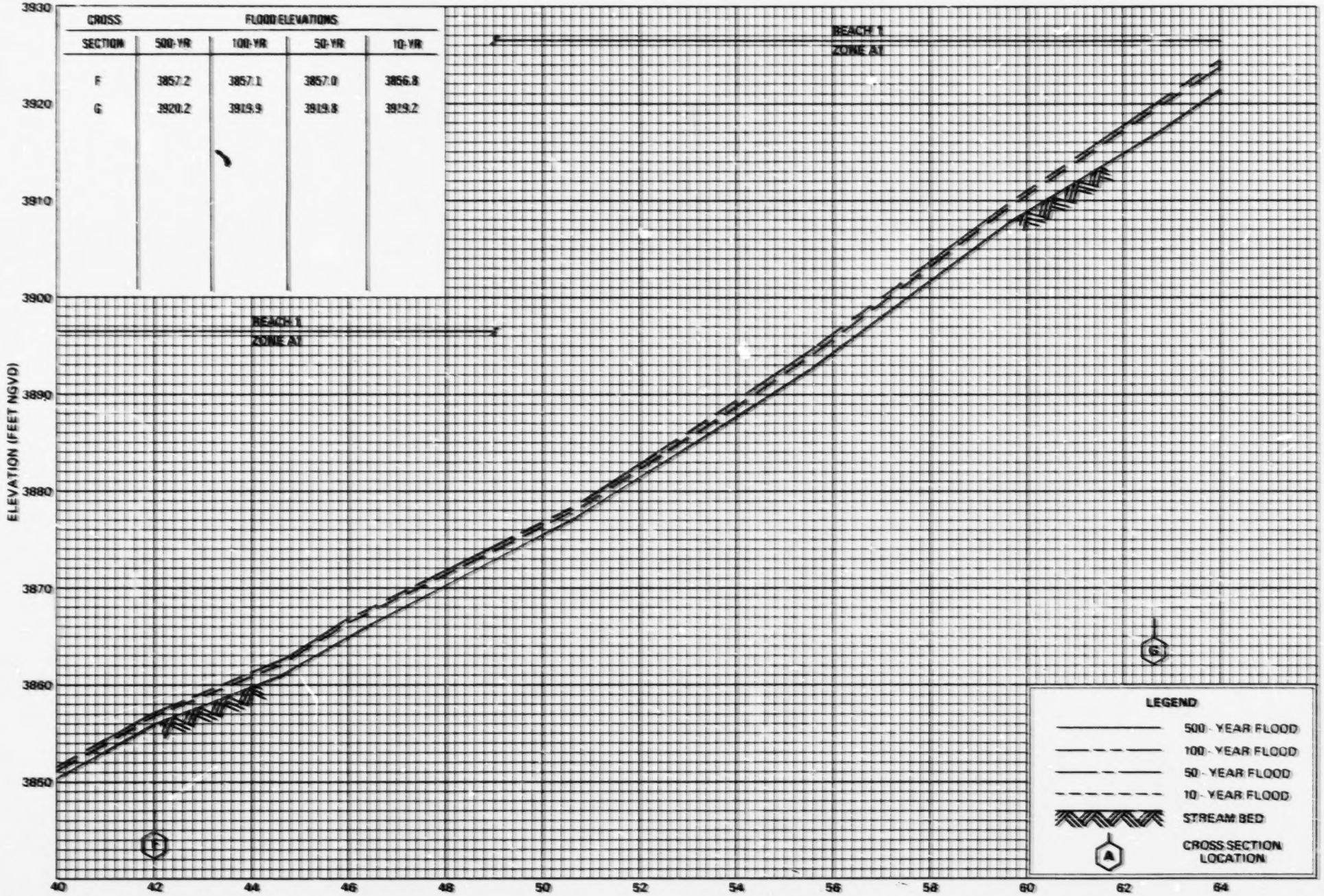
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

59P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
F	3857.2	3857.1	3857.0	3856.8
G	3920.2	3919.9	3919.8	3919.2



NOTE: SUBTRACT 8.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 5

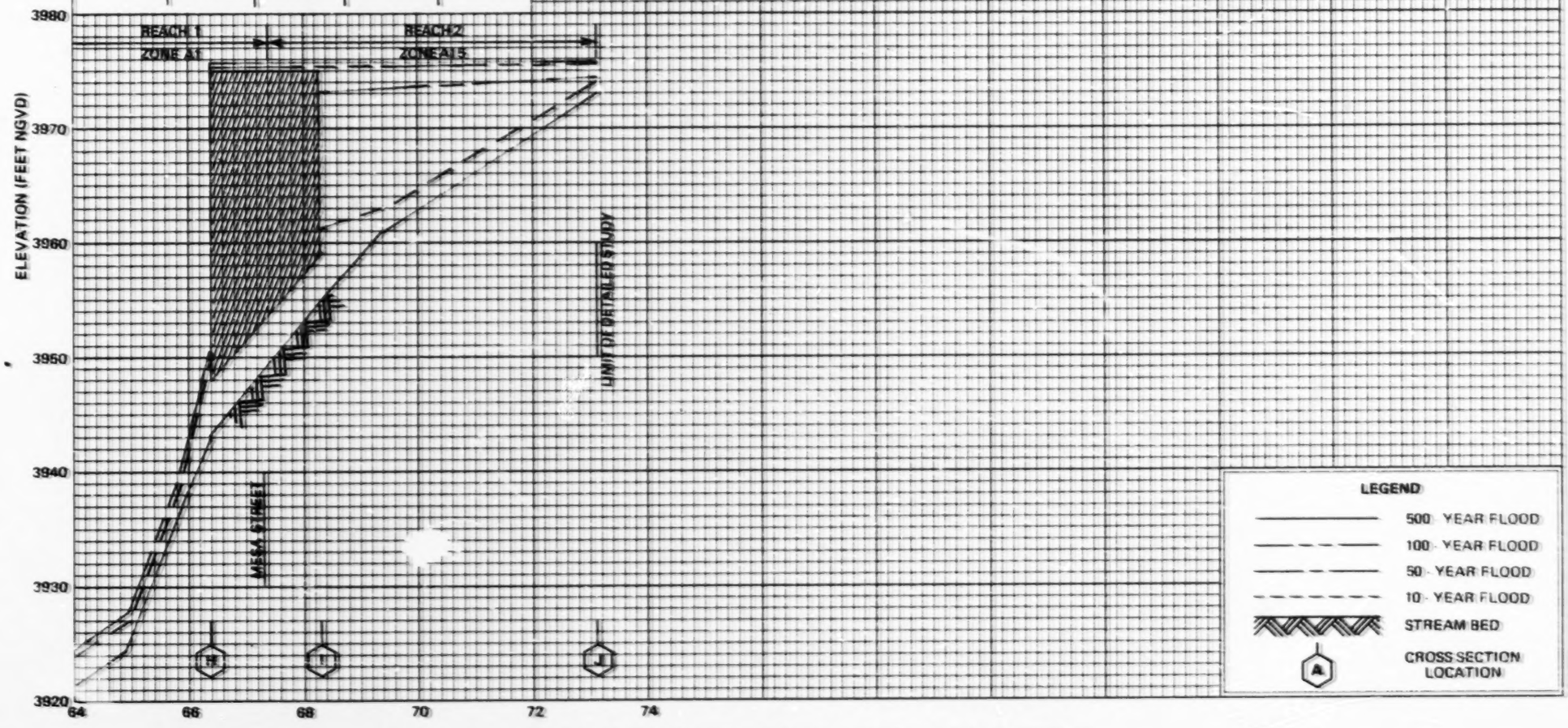
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

60P

BEST COPY AVAILABLE

CROSS SECTION	FLOOD ELEVATIONS			
	500-YR	100-YR	50-YR	10-YR
H	3950.8	3950.3	3950.1	3949.3
I	3975.7	3975.3	3973.3	3961.4
J	3975.7	3975.3	3974.3	3974.0



NOTE: SUBTRACT 3.462 FEET FROM NGVD ELEVATIONS TO CONVERT TO EL PASO DATUM

FLOOD PROFILES

ARROYO 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EL PASO, TX
(EL PASO CO.)

61P

BEST COPY AVAILABLE